AVIATION WEEK

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MAR. 30, 1953

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PRODUCTS

AVIATION 50th ANNIVERSARY
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TIME WAS when planes were either grounded whenever icing conditions occurred, or ran the risk of crashing if they flew. Old-time pilots, faced with the hazard of wings and props "icing up" during flight, were forced to descend to warmer altitudes in an effort to thaw and "shake off" the dangerous ice formations. Many devices were tried, then Goodyear—working with the National Research Council of Canada—developed the Electro-Thermal Iceguard . . .

NOW planes fly safely even when the most difficult icing conditions prevail, thanks to this Iceguard principle. This successful and less complex process of ice elimination embodies a shield of electrically heated conductive rubber which can be used for either continuous or cycling heating action on wings, stabilizers, ducts, antenna-masts, propeller blades and cuffs—tailored to the needs of any aircraft.

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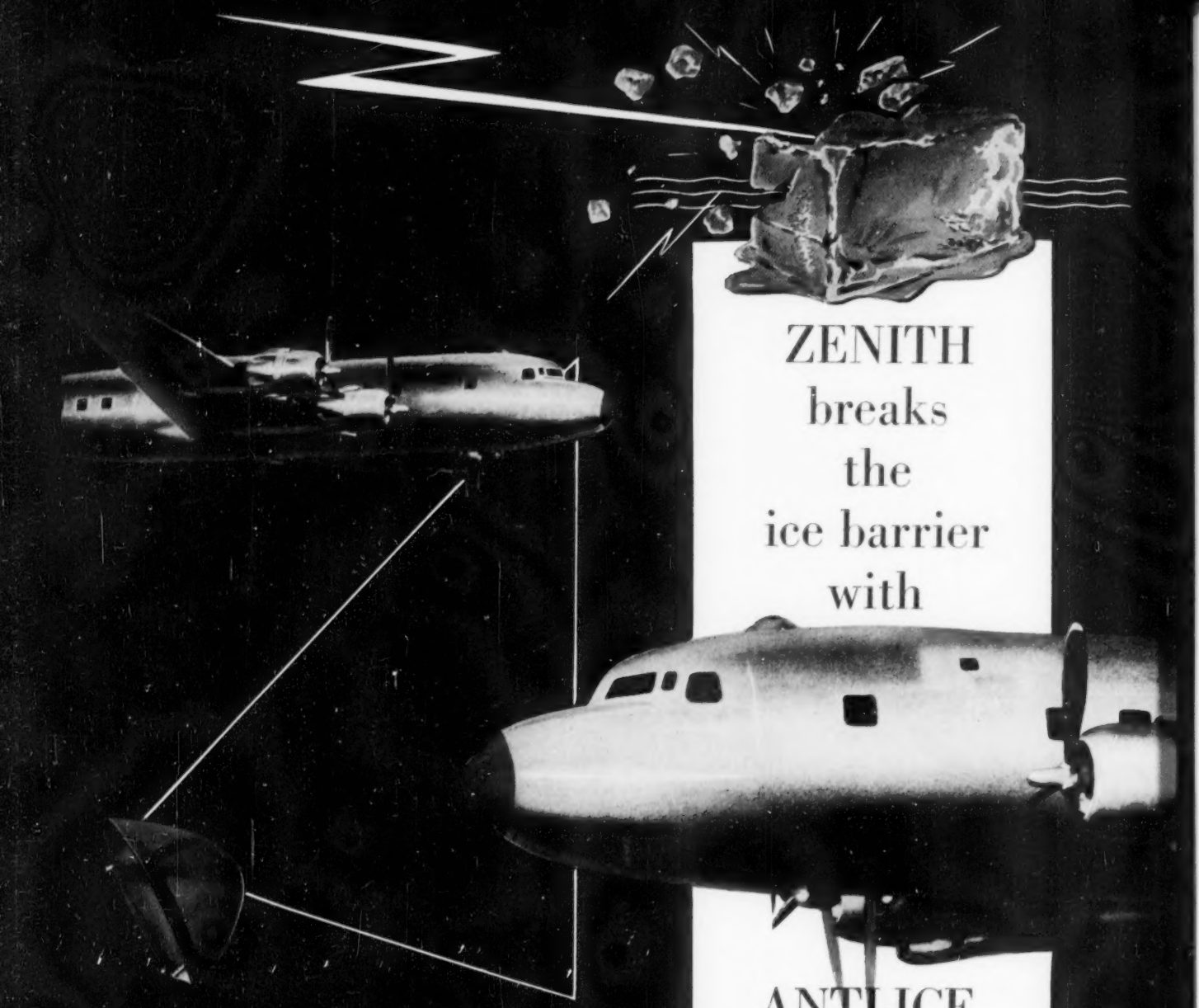

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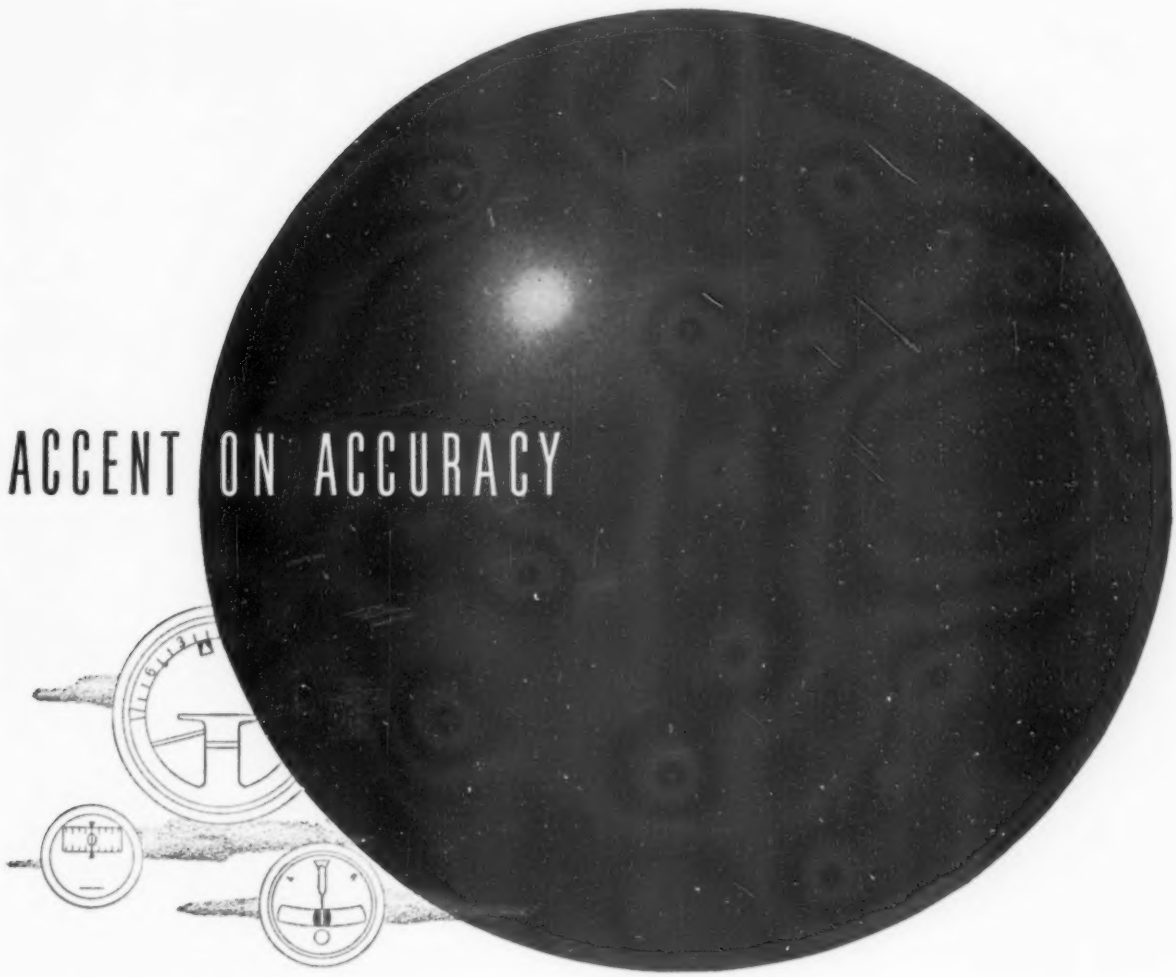

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Aviation Week

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New AiResearch ram air turbine does a 250 pound job for jets... *weighs only 17 pounds!*

At last a *light weight* emergency power source to operate power controls in case of single engine failure! The new AiResearch ram air turbine develops a minimum of 3.4 hp at air speeds from 130 knots to above Mach 1 . . . *at any altitude.* It is now in production.

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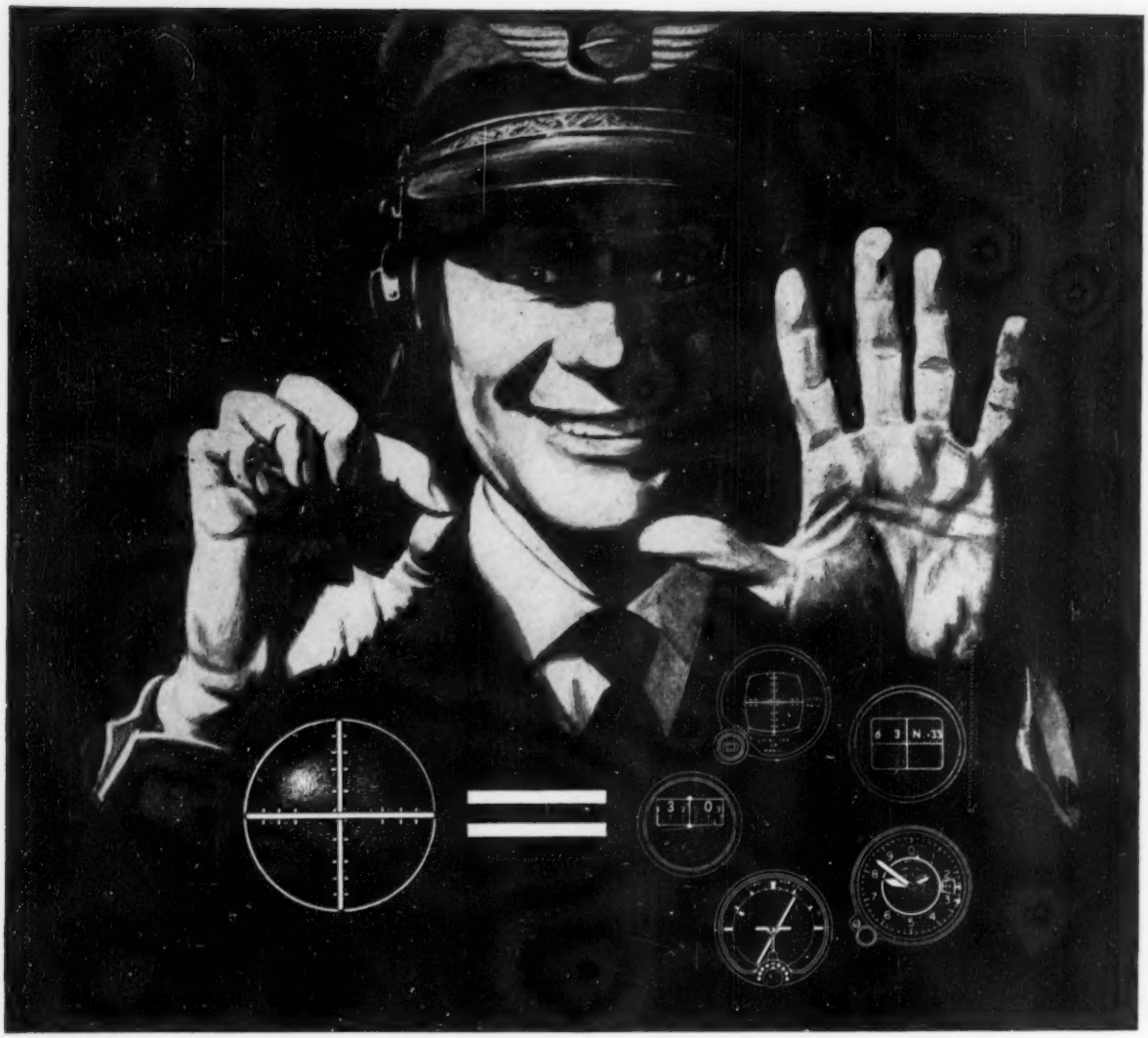

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Yes—it's a fact—the Sperry Zero Reader* Flight Director combines information supplied by *five* basic instruments...the gyro-horizon, directional gyro, magnetic compass, sensitive altimeter, and cross-pointer meter . . . for simplified manual control of aircraft.

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The Flight Director was developed by Sperry with the cooperation and encouragement of the All-Weather Flying Division, USAF, and the Air Transport Association. Its drama starts more than forty years ago with Sperry's first research in gyroscopic flight. And the end of such research and development will never be in sight. For Sperry's program is *continuous*. As it works for today, it pioneers for tomorrow, meeting and solving such complex problems as are presented in the fields of jet aircraft and guided missiles.

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NEWS DIGEST

Domestic

New F-86F Sabres are fighting Russian MiGs in Korea, North American Aviation announced last week. Powered by 5,800-lb.-thrust General Electric J47-GE-27 engines, the improved fighter is in the 650-mph. class, has a combat radius of more than 500 mi. and a maximum ceiling of 45,000 ft. Company reports F-86s have shot down 586 MiGs while only 54 Sabres have been lost.

Air Line Pilots Assn. will hold its first annual Air Safety Forum Apr. 1-3 in Chicago, covering emergency evacuation, aircraft performance standards, noise abatement, fire hazards, cockpit procedures, propeller reversal, approach lighting and use of radar in airline operations. Principal speakers will be John Fornesaro, Boeing flight test chief; aviation consultant Ben. O. Howard, and William Steiglitz, Republic Aviation safety engineer.

Transocean Air Lines' DC-4 crashed and burned Mar. 20 in a rainstorm 20 mi. south of Oakland, Calif., killing 30 Air Force personnel and the transport's civilian crew of five. The plane had been chartered by MATS.

Helicopter operation in airline transport will be discussed by a symposium led by J. T. Dyment, Trans-Canada Air Lines' engineering director, at the sixth International Air Transport Assn. Technical Conference, which opens Apr. 20 in San Juan, P. R.

Maj. Gen. Raymond C. Maude, former AF communications director, has assumed command of the Air Force Cambridge (Mass.) research center.

Flavius Earl Loudy, aeronautical engineer with the Navy office at Grumman Aircraft Engineering Corp., died Mar. 20.

New FD-25B Defender is being built by Fletcher Aviation Corp. at Pasadena, Calif., with first demonstration flights scheduled for this summer. The FD-25B differs from the original Defender only in its change from magnesium sheet to all-aluminum construction and improved radio equipment.

Civilian plane production has been stepped up by Piper Aircraft Corp., Lock Haven, Pa., to 10 aircraft a day in an effort to reduce the company's business plane backlog of more than 800. Piper delivered 504 airplanes during the first four months of the current fiscal year, 210% higher than a year ago.

YUGOSLAV AIR FORCE Lockheed T-33 jet trainers under armed guard after the planes had been delivered under the U. S. Military Aid Program. Yugoslavia is the ninth foreign country to receive the two-seat T-33s. They will be used to indoctrinate pilots picked to fly Republic F-84 Thunderjet fighter-bombers.

Fairchild Aircraft Division was awarded a new subcontract last week to build aluminum outer wing panels and vertical fins for Boeing's B-52 bomber.

Philadelphia's new $15-million International Air Terminal is scheduled to be opened this fall.

James Hainsworth, manager of Central Aero Supply, Millville, N. J., has been elected president of the New Jersey Aviation Trades Assn.

Aero Service Corp. Philadelphia, has formed a subsidiary company at Salt Lake City to compile aerial maps of the West.

Financial

Northrop Aircraft, Inc., Los Angeles, reports a record sales backlog of $533.9 million at the end of the first half of the current fiscal year, highest in the company's history. Net income after taxes for the six-month period ending Jan. 31 was $2,024,892 from sales totaling $94,875,565.

Braniff Airways' net income dropped from $1,270,103 in 1951 to $265,140 last year, despite an increase in gross revenues from $25,215,187 to $31,860,797. The carrier's 1952 income consisted of a $1,050,700 profit on domestic routes, capital gains of $752,400 and a $1,537,000 loss on international.

Kaman Aircraft Corp., Windsor Locks Conn., had a backlog of more than $28 million at the end of last year. Earnings after taxes totaled $246,866 from sales adding up to $7,277,322.

Solar Aircraft Co., San Diego, has authorized redemption of 20,000 of the outstanding shares of the company's cumulative convertible preferred stock.

International

Douglas DC-6Bs will be substituted for de Havilland Comet 2s as new transports on Canadian Pacific Airlines' Sydney-Vancouver route because of the crash Mar. 3 of CPA's first jet liner.

Arkadii Dmitrievich Shvetsov, a top Russian aviation designer, died Mar. 21.

Trans-Canada Air Lines reported last week that operating revenues in 1952 increased 15% to $55,057,708, producing gross earnings of $2,007,879.

Scandinavian Airlines System has been granted permission by the Japanese government to use the polar route on flights from Tokyo to Scandinavia, cutting 23 hours from SAS time.

First jet engine maintenance plant in South America will be built by Rolls-Royce at LAV Venezuelan Airline's base in Caracas.

Three Convair 340s have been purchased by Alitalia, Italy's national airline, for delivery in April, June and September of this year.

For your convenience we've filed our catalog in the

Institute of the Aeronautical Sciences 1953

ENGINEERING CATALOG

Consult it for complete data on Airborne's ROTORette—LINEATOR—ROTORAC & TRIM-TROL electro-mechanical actuators and ANGL-gear right angle bevel gear units.

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The Aviation Week

March 30, 1953

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7—Keystone; 9—(top) Convair; (bottom) Howard Levy; 15—McGraw-Hill World News; 16—USAF; 30—Defense Department; 31—(bottom three-view) Anderton, Model Airplane News; 34—Howard Levy; 39—Convair.

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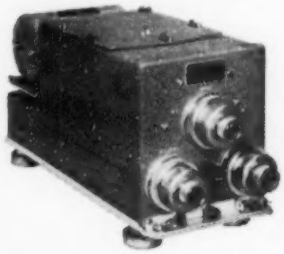

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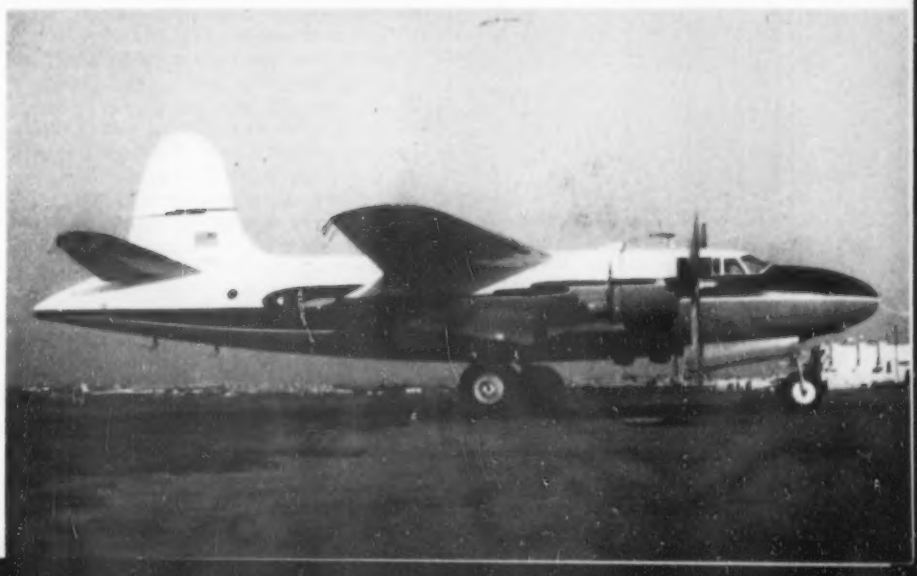
CONVAIR TURBOPROP TRANSPORT—Model (right) of the Convair R3Y-1 Tradewind turboprop-powered flying boat transport slated to go into Navy service across the Pacific early next year, according to official sources. Some design changes from the XP5Y-1 prototype are noticeable. They include new nacelles for the 5,500-hp.-plus Allisons, which have shorter prop driveshafts and tailpipes. Wingtip float struts have been revised to utilize V-shaped braces and more area has been added to the dorsal fin. A later R3Y version features nose-loading doors. The 80-ton planes have a design top speed of more than 350 mph. and takeoff time at full load is approximately 30 seconds. The Tradewind is fitted with air conditioning, high-altitude pressurization systems and rearward-facing passenger seats. Self-contained AiResearch gas turbine compressors supply air for pneumatic engine starters and other auxiliary systems. (Also see story on page 18.)

Plane News in Pictures

NEW JAP LIGHTPLANE—Powered by a 65-hp. Continental engine, this side-by-side two-seater (left) has been built by aeronautical engineering students of Nihon University, Japan, under faculty supervision. Fuselage construction is steel tubing, fabric covered. Wings and tail are plywood covered with fabric. Design top speed is 112 mph. and cruising radius is 310 mi. Span is 27.1 ft. and gross weight 1,100 lb. Landing gear is fixed and low-pressure tires are fitted. Engine was donated by Dallas B. Sherman, Pan American World Airways' Far East regional director.

MODERNIZED MARAUDER — A comeback has been staged by this surplus World War II Martin B-26 Marauder (right) seen in the sleek livery of a highspeed executive transport. It is one of two ordered by Tennessee Gas Transmission Co. to expedite business travel. The reconverted Marauder can seat 14-16. Numerous changes have been made in the conversion, which is being handled by AiResearch Aviation Service Co., Los Angeles, a Division of the Garrett Corp. New P&WA R2800 engines of about 2,400 hp. each have been installed and a dorsal fin and long, pointed tailcone added. Cabin windows are of large, picture type.



Remington Rand Methods News

Which answer is correct for your payroll problem?

Long ago we gave up the idea there could be only one best method for writing payrolls. But show us the specific needs of your particular payroll department and we promise to come up with a profitable answer in terms of speed, accuracy and clerical savings. For instance, here are just a few...

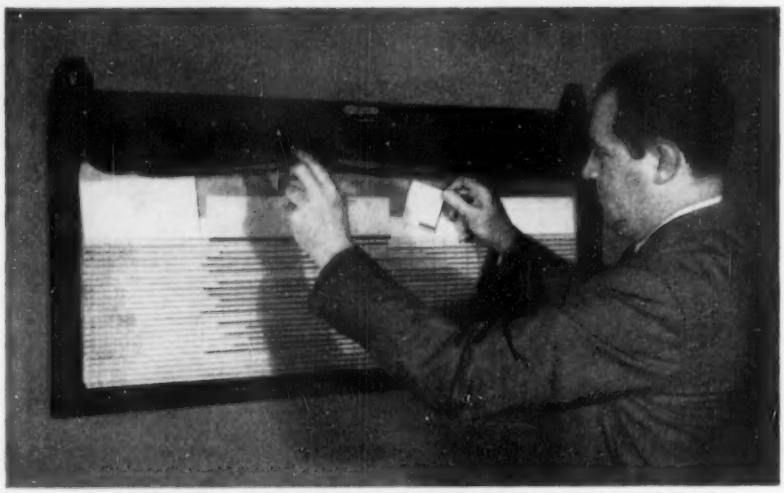
One low-cost answer is the Multi-Matic system which produces a complete set of records from a single manual writing. It's a good method for paying off workers in between paydays; for decentralized payrolls; for the small-to-medium shop. See folder **LL-162.**

Another answer for the economy-minded is our posting calculator payroll method which produces pay records while the payroll calculations are made. For mechanization at minimum cost, see folder **AC-568.**

But, if you want to get out paychecks really fast, look into our remarkable new STUB-CHECK plan – a machine payroll method which eliminates many work steps; also pays for itself in the savings on check forms alone. See **AB-569.**

If you have a piecework or other incentive plan, it may pay you to use punched-card methods which also give you complete labor distribution and cost analyses. Study the detailed procedures in our new case history **SPTM-4218.** Or, if you have a large daywork payroll, see the procedures in **SPTM-4217.**

ABSENTEE CONTROL THAT WORKS! To keep production on schedule, you need people on the job. Let us show you a tested method for control of attendance and punctuality. It's readily accepted by workers because it insures equal treatment for all. You set the yardsticks. Then this simplified record gives you a visual picture of how each employee and department measures up. See our personnel department procedures manual X-521.



BIG AND BOLD MAINTENANCE SCHEDULE. This brand new method helps the maintenance superintendent schedule or re-schedule the work of his crew with both ease and accuracy. It gives a graphic picture of the jobs coming up for each man. And a special written work-order form helps eliminate maintenance errors; simplifies the costing of each job. This is the method featured at Cleveland Maintenance Show. Check below for *Sample Forms.* Also see scheduling manual KD-341.

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P-9

WHO'S WHERE

In the Front Office

James W. Aston, Dallas banker and World War II Air Force colonel, has been elected a director of American Airlines.

R. S. Ingersoll, president of Ingersoll Products Division, and **L. G. Porter** have been named administrative vice presidents of Borg-Warner Corp., Chicago. New vice president and general counsel is **Robert W. Murphy.**

W. Thomas Beebe, a vice president of Chicago & Southern Air Lines, will be personnel director of Delta-C&S after merger of the two carriers. **R. H. Wharton** has been appointed assistant to the president.

Harold W. Hunter has been named vice president-manufacturing and **Maj. Gen. Ralph C. Royce** (USAF Ret.) has been appointed assistant to the president of American Airmotive Corp., Miami.

Max King and **Ray Costello** are new vice presidents of Southwest Airways Co.

Leon Podolsky has been appointed technical assistant to the president of Sprague Electric Co., North Adams, Mass.

Changes

William F. Ballhaus has been named chief engineer of Northrop Aircraft, Inc., Hawthorne, Calif.

Thomas Z. Fagan has been promoted to director of sales and service and **William A. Uline** to general sales manager of Scintilla Magneto Division, Bendix Aviation Corp., Sidney, N. Y.

C. C. Hurlburt, member of National Aircraft Standards Committee and chairman of Helicopter Standards Committee, has joined Klincher Locknut Corp., Indianapolis, as director of engineering.

Philip E. Spindell is chief engineer of Template Reproduction & Engineering Co., Philadelphia.

C. Clinton Honeywell has been appointed chief engineer of Servo-Tek Products Co., Hawthorne, N. J.

Fred Essig has been promoted by Rheem Manufacturing Co., Downey, Calif., to plant superintendent of the Aircraft Division's missile factory.

Paul E. Wolfe recently was appointed director of project engineering, Heli-Coil Corp., Danbury, Conn.

Gordon W. Guise is plant engineer at North American Aviation's Columbus (Ohio) Division.

T. J. Venator has been named supervisor of aviation activities for Westinghouse Electric Corp. in Los Angeles.

Charles D. Arcularius has been appointed director of procurment of Ford Instrument Co., Long Island City, N. Y.

Honors and Elections

Oscar Seidman, test analysis chief of Navy's Bureau of Aeronautics and **Mrs. Dorothy M. Simon,** research scientist at NACA's flight propulsion laboratory, recently were granted Rockefeller Public Service Awards.

INDUSTRY OBSERVER

►Republic Aviation will modify a pair of its sweptwing F-84F Thunderstreaks for experimental use as parasite fighters slung externally on a Convair B-36. Convair currently is experimenting with a pair of straight-wing F-84Es carried aloft by a B-36 over the Ft. Worth area.

►Douglas Aircraft is exploring the possibilities of the crescent wing for its DC-8 jet transport. Early desk models of the DC-8 distributed to prospective airline customers had a conventional swept wing with pod-mounted engines. Douglas engineers feel a more advanced type highspeed wing will be required to last through the complete development cycle of the DC-8 airframe.

►Los Angeles Airways and Aerojet are working on a project to fit rocket motors in the rotor blade tips of the Sikorsky S-55 helicopter for emergency power. Aerojet has developed an installation kit for the S-55 rotor. Clarence Belinn, LAA president, believes that this supplemental power will provide a significant advance in helicopter safety and performance.

►Boeing-Wichita is testing aluminum nuts containing stainless steel wire inserts in the B-47 wing and empennage. If tests are successful, use of the aluminum nuts with steel inserts instead of all-steel nuts reportedly will result in important weight savings in the B-47 airframe.

►Royal Air Force plans to supplant its Gloster Meteor photo-reconnaissance planes with a newly developed photo version of the Vickers Supermarine Swift. Photo-recon Canberras, just going into RAF service, eventually will be replaced by a photo-reconnaissance version of the Vickers Valiant multi-jet bomber. Swifts will do short-range photo work with Valiants assigned to strategic reconnaissance.

►First British sweptwing carrier-based fighter has been ordered by the British Admiralty from Vickers Supermarine Division. The new super-priority fighter is a sweptwing version of the earlier Vickers Type 508 that featured a V-tail and was powered by two Rolls-Royce Avons. The new shipboard fighters are scheduled for service aboard the recently launched carrier Hermes which features an angled flight deck and steam catapults.

►First RAF jet trainer order has gone to the Percival Provost, powered by an Armstrong-Siddeley Viper turbojet of 1,640 lb. static thrust.

►A major policy change in the radar safety beacon (transponder) program is expected as a result of recent report by Radio Technical Commission for Aeronautics which calls for special 1,000-mc. ground interrogators rather than using existing 3,000-mc. air surveillance radars (ASR) to trigger airborne safety beacons. This will involve the installation of added ground equipment but should solve problems encountered with old safety beacon design. The new approach is expected to be acceptable to foreign airlines and compatible with U. S. military requirements.

►Air Force answer to critics of the Cessna jet trainer award on the grounds that it is a twin-engine plane and too complicated for a trainer, is that the twin-engine plane is safer and that there is no single powerplant that meets the weight requirement.

►Chevrolet's Tonawanda Division has begun production of the Wright R-3350-85 Turbo Compound engine rated at 3,500 hp. Chevrolet has compiled an outstanding production record on earlier model R3350 engines and will need an additional 500 workers over its present 2,700 employment to reach its production peak this summer.

►Air Navigation Development Board reports that instrument flight problems for helicopters are still not close to solution. ANDB says 1.55 seconds are required by an airline pilot to initiate a control movement in instrument recovery problems. In that time, many present model helicopters would have reached an attitude from which it would be impossible to recover.

Washington Roundup

Procurement Shifts

First effects of the Defense Department budget tightening have hit manufacturers of transports and trainers. Among the production cutbacks now being processed by the Pentagon and Air Materiel Command:

- Chase Aircraft C-123 (due to a lag in getting production going at Willow Run).
- Douglas C-124C (due primarily to shortages of licensee-produced R4360 engines).
- Lockheed C-121.

Convair faces cancellation of its recently announced order for C-131C military versions of the Model 340 commercial airliner. Pentagon plans to divert funds from washing out the program for some 60 TAC and SAC C-131Cs to buying additional C-119s from Fairchild Engine and Airplane Corp.'s Hagerstown Division. Convairs' C-131A production of an air evacuation version of the Model 240 airliner for MATS is still intact.

Beech also probably will be affected in its trainer programs.

AMC Shakeup

Transfer of Maj. Gen. Mark Bradley from director of procurement for AMC to Europe is only the beginning of a shakeup at Air Materiel Command. Pentagon sources indicate that Lieut. Gen. Orval Cook, USAF Deputy Chief of Staff, Materiel, also is slated for transfer soon. Industry leaders are hopeful that the AMC shakeup will produce better industry-AMC relations. Responsible aircraft industry leaders have been extremely critical during recent years of what they term "socialistic" trends in AMC's attitude on such problems as proprietary rights, off-shore procurement and profits.

Engine Problem

Watch for another "re-scheduling" of aircraft engine production. Reason: The licensee and subcontracting programs still are lagging badly although most prime engine contractors are close to schedules. Airframe manufacturers dependent on the lagging engines may also find their schedules "stretched" to meet the engine output.

Nonsked Crackdown

Nonsked transport operators are facing a tighter pinch as a result of recent government action:

- U. S. Supreme Court decision recently upheld CAB's right to restrict their operations to infrequent flights by refusing to review the case of Amos Heacock and his Air Transport Associates against CAB. This will gradually eliminate much of current revenues nonskeds are making from common carriage flights.
- U. S. Circuit Court decision revoking letter of registration of American Air Transport of Miami because of too frequent operations.
- CAB ruling that the C-46 must meet transport category requirements by the year's end. Reducing frequency of nonsked operations will mean that most C-46 operators will be hard pressed to finance conversion of their C-46 R2800 engines to the latest and more powerful models necessary to meet new performance requirements.

Many nonsked operators are planning to join "Club 45," which consists of those who have had their registration revoked and are now barred from common carriage and are restricted to contract operations (largely military) under Part 45 of Civil Air Regulations.

User Charge Showdown

With a showdown due before long on who is to pay user charges for federal airways, Rep. Carl Hinshaw developed a strong case against imposing all the burden on air carriers at a House Interstate and Foreign Commerce Committee session. He developed these facts from Civil Aeronautics Administrator-designate Fred Lee:

- Air carriers operate 1,400 aircraft, compared with 10,000 corporate multi-engine planes and 50,000 private planes.
- Only 4.7 million of the total 16.6 million airways operations in 1952 were by carriers. The remainder: 9.1 million by civil aircraft, other than carriers, and 2.8 million by military aircraft.
- 60% of the instrument approaches last year were by air carriers.

Commerce Department's study on user charges for all types of federally financed facilities is due for submission to Undersecretary for Transportation Robert Murray early in April. It probably will take several weeks to clear his office and Budget Bureau, probably not reaching Congress until May.

Air Safety Shift

Watch for the new CAA administration to clean house in the Office of Aviation Safety. Emphasis will be on putting men with modern aircraft operational experience into key spots and eliminating conflicting regional interpretations of safety regulations by more centralization in Washington.

Airport Fund Strategy

Commerce Department hopes to avoid the strong local political pressures exerted against specific airport project cuts by refusing to make public detailed information on where the cuts will be made. Washington observers predict that Commerce won't be able to make this policy stick.

USAF vs. McNeil

So far, Air Force has successfully blocked the plan of Assistant Secretary W. S. McNeil to convert MATS to a self-supporting operation, on a revolving-fund basis, after the pattern of Military Sea Transport Service.

With a charter resembling articles of incorporation and a $100-million capitalization provided from Navy funds, MSTS has been operating as a separate entity, charging "customers"—Army, Navy and Air Force—for services since last July.

USAF, however, wants MATS retained as an integral part for "essential training operations"—and so far has had its way.

Airline industry is apprehensive that if MATS is put on its own it might develop into a competitive operation. The shipping industry, which has similar apprehension, though, reports that the MSTS is working satisfactorily from its view.

—Washington Staff

AVIATION WEEK VOL. 58, NO. 13
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Aircraft Defense Expansion Nears Peak

- **Plants produce 16,800 planes in two years.**
- **Order backlogs stretch production through '54.**

Aircraft manufacturers continued last week to report record postwar profits for 1952 with large backlogs of orders stretching through 1954.

At the same time, De Witt C. Ramsey, president of the Aircraft Industries Assn., reported the industry had produced more than 200 million airframe pounds and 16,800 aircraft since 1950. This compares with 114 million airframe pounds produced in the first three years of World War II expansion from 1939 through 1941.

The aircraft industry virtually has completed its scheduled post-Korean expansion of production facilities, according to Ramsey, and now is buttressed by some 61,000 subcontractors and suppliers.

Here are the latest manufacturer reports:

1952 Annual Reports Reflect Air Buildup . . .

	Sales	Net Earnings	Backlog (millions)
United Aircraft Corp.	$667,769,234*	$17,809,391	$1,460
Boeing Airplane Co.	739,010,214	14,084,449	1,648
Glenn L. Martin Co.	143,999,382	5,800,000**	650
Temco Aircraft Corp.	55,100,000**	1,859,000	276

* Shipments.
** Approximate.
Sources: Annual reports of companies.

United Aircraft Corp.

The largest postwar profit reported to date is the $17,809,391 net income of United Aircraft Corp. for 1952. This compares with $14,266,867 for 1951. UAC reported a backlog as of Dec. 31, 1952, of $1.46 billion, compared with $1.3 billion at the end of 1951.

United Aircraft's post-Korean expansion program increased the value of its property and equipment by $30 million during the year to a total of $143 million. Net fixed assets of $72 million remained after deductions for depreciation and amortization. This compares with $50 million at 1952's beginning.

Production of the corporation's four operating divisions has trebled during the three years of emergency expansion, with shipments totaling $667,769,234 for 1952. Employment has reached a postwar peak of 50,705 and UAC facilities now include approximately 10 million sq. ft. of plant area, of which nearly 60% is owned by the aircraft manufacturer.

Bulk of UAC's employment, floorspace and sales were accounted for by the Pratt & Whitney Aircraft Division, which now occupies four plants in Connecticut with more than 6 million sq. ft. of floor space.

► **Pratt & Whitney Aircraft**—P&WA's future production plans are based on two advanced gas turbine developments: the J57 axial-flow split compressor turbojet and the T34 axial-flow turboprop.

Here are details of the programs:

• **J57 turbojet.** UAC reveals that Pratt & Whitney already is in production on versions of the J57, scheduled for use in multi-jet bomber aircraft. This is about a 10,000-lb.-thrust version without afterburner and will be used in the Boeing B-52 and the Douglas A3D. Advanced development leading to production of a fighter version of the 15,000-lb.-thrust J57 with afterburner also is underway.

United Aircraft says this version will be used in the North American F-100, but Pentagon sources indicate it also will power the McDonnell F-101 and Convair F-102 supersonic fighters, both scheduled for substantial production. In addition, a recent decision by the Navy's Bureau of Aeronautics has designated the J57 with afterburner as an alternate for the Westinghouse J40 in the Douglas F4D Skyray. Bulk of the Skyray production will utilize the J57.

Not mentioned in the UAC report is an advanced development of the J57 design designated the J75 and aimed at producing 15,000 lb. of thrust without afterburning.

• **T34 turboprop.** UAC reported the T34 has passed its 150-hour production qualification test at a rating of 5,700 equivalent shaft horsepower. Tooling up for quantity production is underway. Production versions of the T34 are scheduled for use in an advanced version of the Douglas C-124 (AVIATION WEEK Mar. 9, p. 13).

P&WA also is believed to have advanced developments of the T34 aimed at considerably higher powers.

► **Chance Vought**—This division will increase its production of the Regulus surface-to-surface guided missile during 1953. The Regulus is expected to go into limited service soon aboard Navy submarines specially equipped for launching guided missiles. The UAC report reveals that the Regulus is equipped with remote-control devices and temporary landing gear that make it possible to recover the missile during test operations. Vought has completed production of the F7U-1 Cutlass and is producing F7U-3 versions powered by Allison J35 turbojets pending appearance of the Westinghouse J46 jet, originally scheduled to power the Cutlass.

► **Hamilton Standard**—The Propeller Division is building two experimental versions of supersonic props for turboprop engines and is mating its three-bladed Turbo-Hydromatic propeller with the T34 in tests of the installation designed to power the Lockheed R7V-2 military transport.

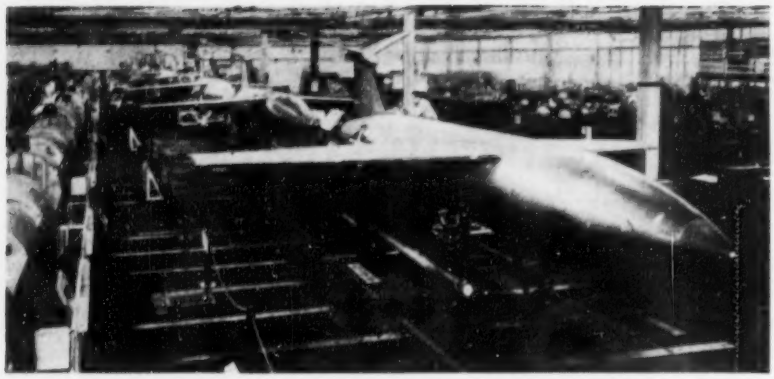
► **Sikorsky**—The helicopter division is producing S-55 and S-52 helicopters and is working on a large twin-engine assault transport for the Marines and other advanced helicopter developments.

Boeing Airplane Co.

Boeing Airplane Co. delivered more planes to the Air Force from its Wichita and Seattle plants during 1952 than in any year since 1945, and the aircraft manufacturer's backlog of unfilled orders totaled approximately $1,648 million at the end of last year—21% higher than in 1951, the company reports.

Sales increased $401,709,648 from the previous year to a total of $739,010,214, boosting net earnings after taxes to $14,084,449. Net earnings in 1951 were $7,140,751.

Boeing president William M. Allen reported production of B-47 Stratojets reached one per working day, with a



SEVEN MARTIN B-61A Matador pilotless surface-to-surface aircraft can be seen on the final assembly line at Baltimore, Md., indicating the firm's progress in missile production. Particularly noticeable in this view of the Matadors is the sharp dihedral on the horizontal tail mounted atop the vertical stabilizer.

reduction of manhours to 1.4 per pound of the airframe.

▶ **Missile Work**—Development of pilotless aircraft was given priority by Boeing, making it the third largest project in the company's Engineering Division, Allen said.

Boeing also started a jet transport prototype project, and Allen predicted the company's jet liner will be flying in 1954.

"We are of the opinion that the company can build a prototype transport which will enable us to demonstrate to the military the principal characteristics of a combination tanker and jet transport and, at the same time, demonstrate to the commercial airlines the principal characteristics of a production jet airliner," Allen said.

Glenn L. Martin Co.

Significant new margin on the profit side of Glenn L. Martin Co.'s 1952 annual report shows that the Baltimore airplane manufacturer has moved up substantially in financial strength in the first year under its new management.

Net earnings of $5.8 million were reported for 1952, compared with a net loss of $22.2 million the preceding year. The net income was equivalent to $3.03 earnings a share on 1,913,974 shares outstanding.

▶ **Debt Reduction**—Sizable reduction in debt was another important Martin gain. On Dec. 31, interest-bearing debt including advance payments stood at $27 million, a reduction of more than $26 million over the company's position at the end of 1951.

President George M. Bunker reported the reduction made it possible to make new arrangements increasing the company's V-loan credit with commercial banks to $32.5 million, but only $17 million of this credit is being used. At the same time in January 1953 the company either retired or cancelled all loans and commitments with Reconstruction Finance Corp., terminating a long-time financing relationship with RFC.

▶ **Tax Writeoff**—Another plus factor reported for Martin is a tax writeoff of costs and losses on the company's commercial airplane program (4-0-4 airliners). Martin's legal counsel has given an opinion that 1952 income is not subject to federal income tax because of the writeoff, and that approximately $34 million remains for reduction of book income otherwise subject to federal income tax for 1953 and additional years up through 1957.

Sales for the year were reported as $143,999,382, compared with $68,480,519 the previous year. Backlog of military orders at year end stood at $650 million, compared with $402 million the previous year.

▶ **In Production**—The company reported substantial deliveries of P5M-1 Marlin submarine hunter-killer seaplanes to the Navy in 1952 and continuing in 1953. Deliveries were completed for the Martin 4-0-4 airliner series, with more than 100 planes now in operation. Deliveries were started for the B-61 Matador pilotless bomber to the USAF. Powered with an Allison J33 jet engine, it is the first of the guided missiles to get on a production-line manufacturing basis, and one of the company's most important single military sales items.

Substantial production is underway on the British-designed Canberra B-57A twin-jet night intruder bomber, with first deliveries scheduled to the Air Force this year. The first Martin-built Canberra flight has been delayed by failure of Curtiss-Wright Corp. to meet delivery schedules on Sapphire J65 jet engines.

Small Navy contracts for producing the Viking high-altitude research rocket for study of the upper atmosphere and for ballistics study are continuing.

▶ **Avionics**—Design and manufacture of various avionic systems at Martin has progressed rapidly, and at yearend a number of projects were in active production, Bunker reported, including area defense systems, guidance systems, radar and telemetering devices.

▶ **Notes Conversion**—As part of its financing interchanges, Martin called its outstanding 10-year 4% convertible subordinated notes, and by Feb. 16 all had been presented for conversion into 220,338 shares of common stock. Meanwhile, the company reserved 99,000 shares of common for sale at $9.50 a share, to holders of common stock purchase warrants issued in connection with a sale of $6 million in notes last April, and 200,000 common shares to be issued under a stock option plan for officers and key employes, under options expiring June 30, 1962.

Presses Approved

USAF heavy press program has survived the Defense Department economy ax as predicted in AVIATION WEEK (Mar. 2, p. 98). After reviewing the $400-million program, the Defense Department concurred with AF estimate that the heavy forging and extrusion presses now under construction are vital to maintaining U. S. leadership in aircraft production. The Air Force expects its press program to be in operation by December 1954.

Temco Aircraft Corp.

Consistent increases in sales by Temco Aircraft Corp., (formerly Texas Engineering and Manufacturing Co., Inc.) which have been maintained each year since the company started seven years ago, brought the 1952 sales volume up to $55.1 million for the Dallas, Tex., organization and its subsidiary, Luscombe Airplane Corp. This compared with $37.2 million a year before.

Temco president Robert McCulloch and H. L. Howard, executive vice president, reported the backlog of unfilled orders stood at $276 million at yearend, more than double the $124-million backlog a year before. Consolidated net profit was $1,859,000 for 1952 against $1,131,854 the previous year.

▶ **Plan Merger**—Plans for merging the Luscombe corporation into Temco are expected to be approved by stockholders of the two companies Apr. 2, after which Luscombe would be operated as a division of Temco. Temco already owns 757,255 shares of Luscombe com-

mon out of a total of 886,733 shares. Temco also also holds all the Luscombe preferred stock, 5,000 shares. Tax writeoff of approximately $1 million has been taken on losses sustained by Luscombe before Apr. 1, 1950, when Temco acquired control. However, Temco paid $3,315,000 in federal income taxes in 1952, plus $533,501 in state and local taxes.

▶**Navy Fighter**—Biggest single Temco production contract is as second source for the McDonnell F3H sweptwing Navy jet fighter. Temco is just tooling up for production on this plane, but is in major production on rear fuselage assemblies for the Boeing B-47 Stratojet bomber, center wing sections for the Douglas A2D turboprop attack plane, outer wing panels for the Lockheed P2V-6 Neptune patrol bomber, and flaps and bomb-bay doors for the Martin P5M patrol bomber.

▶**Overhaul Center**—At Temco's Greenville, Tex., overhaul and modification center, periodic overhauls continue on MATS C-54 transports under contracts which began in 1948. Pioneer Air Lines had its fleet of nine Martin 2-0-2s overhauled and modified at the base just before CAB made its adverse subsidy decision, and other airlines and executive aircraft owners are regular customers. Greenville also is the location for modification of a large group of Ryan Navions into twin Navions under contract to Jack Riley at Ft. Lauderdale, Fla., who has certificated the modified executive four-placer, with two 140-hp. Lycoming engines.

▶**Luscombe Output**—Among other 1952 projects at the Luscombe plant at Garland, Tex., were doors, rudders and elevators for the Convair B-36 bomber and overhaul of Republic F-47 wings under Temco subcontract.

Combined employment of Temco and Luscombe at year end stood at 7,700 persons, with an increase of several thousand more expected in the year 1953.

▶**Engineering Expansion**—Expansion of Temco's engineering department in 1952 is expected to continue with several company-designed projects, including first-line combat aircraft now in the drawing board or proposal stage. Temco submitted two turbine-powered trainer design proposals in the recent Air Force trainer competition.

Thrust of 20,000 Lb. Predicted by 1960

Jet engine sea level static thrust will soar to 20,000 lb. for individual powerplants by 1960, Air Commodore F. R. Banks, Britain's Ministry of Supply Director of Engine Research and Development, told a recent Cleveland Section meeting of the Institute of the Aeronautical Sciences. He said that with afterburner this value will reach 28,000 lb.

For the subsonic bomber, his 1960 projection is that its total thrust possibly will be 80,000 lb. to cope with increased altitude or load.

Projecting to 1960 the improvement in specific fuel consumption, Banks envisions a drop to about .83 lb./lb. thrust/hr. for turbojets and bypass engines at 36,000 ft. at 575 mph. maximum continuous rating from present value of about 1.05 for sea level static maximum rating. SFC is seen dropping to 0.6 lb./lb. thrust/hr. from a present value of about .82.

▶**British Production**—Banks also went to bat to dispel a U. S. conception of English engine producibility.

Commenting that recent articles in the American press said British-designed engines are difficult to produce in quantity, he contended: "This is certainly not the case when considered in terms of production costs. All aviation engines are relatively difficult to produce; but there are none that I know which cannot be produced in quantity by the facilities you (the U. S.) possess, coupled with the great ability of your production specialists."

▶**Chinese Copy**—Underscoring these remarks Banks commented on licensed engines. ". . . It is very important not to make any changes from the original purely to facilitate production. . . . A licensed engine should be a 'Chinese copy' of the original both in regard to materials and manufacture."

This may have been a reference to Wright Aeronautical's J65 Sapphire, for Banks' paper continued: "Although the particular engine in question had already passed the type or model test, it was still in the early development stage and, therefore, more vulnerable to engineering and material changes. It was quite natural, however, to acquire the license for the engine in its early development, in order to insure the most up-to-date product. It needs great caution and restraint on the part of the licensee firm in making any engineering change, particularly for production reasons, where production may be just starting or already in full spate. . . ."

If this reference were to the J65, Wright engineers surely could argue with Banks on the producibility of the engine from American mass-production methods and requirements viewpoints.

New Nomad Engine For BEA Transport

(*McGraw-Hill World News*)

London—British European Airways plans to convert eight of its piston engine Airspeed Ambassador transports to take the new 3,135-hp. Napier Nomad NNM. 6 diesel-gas turbine compound engine. The new powerplant is designed for fuel consumption of .33 to .35 lb./hp. over a wide range of altitudes.

The Ambassadors are now powered by two 2,600-hp. Bristol Centaurus engines. The new Nomad is virtually complete redesign over the earlier NNM. 3. It is only 9 ft. 11 in. long, or about 3 ft. 6 in. shorter and approximately a half-ton lighter than the NNM. 3. Its operation is similar to that of a twin-spool turbojet in that the diesel portion supplies initial power and the turbine takes the load after power is built up.

First flight tests of the new Nomad are expected to start late this year in a four-engine Avro Shackleton reconnaissance plane and reportedly may also be installed in RAF Transport Command's large four-engine Blackburn and Universal Beverley cargo planes, 20 of which have been ordered.

The U. S. Navy, among other American groups, also is showing interest in the NNM. 6. A number of U. S. technicians have been studying the powerplant at Napier's plant outside London.

MADE IN THE PHILIPPINES

Shown on its first test flight is the Maya XL-14 designed by Antonio J. De Leon of the Manila Institute of Science, which also built the craft. It is powered by a 100-hp. Lycoming O-235-2 engine, the only major imported component. The XL-14's interesting construction includes use of woven material of bamboo strips, called Wovex, for the stressed skin covering. The all-wood structure uses native species such as Tangili, Whit Luan, Calantas and Mayapis. The plane's gross weight is 1,716 lb. Wingspan is 33.6 ft., length 21 ft. and height 8 ft. It has attained 115 mph. and is designed for a 300-mi. range and a 12,500-ft. service ceiling.

House Approves Aro As AEDC Operator

House Armed Services Committee last week approved operation of Air Force's Arnold Engineering Development Center by Aro, Inc.

After a brief session, the House committee unanimously voted to repeal an amendment to the current 1953 fiscal year USAF budget barring payments to Aro after the end of March. Committee chairman Dewey Short said he had confidence in Gen. Jack Sverdrup, partner in the firm of Sverdrup and Parcel, Inc., parent corporation of Aro. Short led an unsuccessful attempt in the House to throw out the ban provision last year.

USAF has entered a fourth-month no-fee contract with Sverdrup and Parcel to continue operations after Mar. 31.

▶ **Senate Lineup**—On the Senate side, Sen. Albert Gore—who, as a member of the House, launched an attack on Aro last year that resulted in the ban on payments to the firm—will request that consideration be given to direct USAF operation of AEDC, operation by National Advisory Committee for Aeronautics or by a non-profit organization.

Sen. Estes Kefauver, who concurs with Gore, is on the Senate Armed Services Committee that will consider the matter. Sen. Stuart Symington, former Secretary for Air who made the decision in favor of AEDC operation by Aro, also is a member of the committee.

▶ **Talbott Support**—Urging the House committee to repeal the ban on Aro, Secretary for Air Harold Talbott stressed the urgency of developing AEDC:

"I have come to the conclusion since becoming Secretary of the Air Force that the development of fire power, particularly atomic fire power, is well ahead of the development of the means of its delivery, and include in this latter category both aircraft engines and airframes. The need for the development of aircraft engines and airframes to keep pace is obvious. The mission of the AEDC is to meet this requirement. The successful performance of this mission can be jeopardized by low morale and delays. . . ."

General Describes Army Missile Effort

Push-button warfare is "not yet with us," according to Gen. Thomas K. Vincent, commanding the Redstone Arsenal and director of the Army's guided missile research program. But he added, "we aren't sitting on our hands."

Gen. Vincent, speaking at the annual meeting banquet of the American Society of Tool Engineers in Detroit recently, said we now have two guided missiles in production, presumably Nike and Corporal E. (Aviation Week Mar. 2, p. 83).

Gen. Vincent said the job of Redstone Arsenal is to develop missiles, then turn them over to industry for production. (Example: Chrysler's recent production contract for the so-called Redstone ground-to-ground missile.) As an example of the magnitude of our effort, he cited last year's payroll of $21.5 million for Redstone Arsenal alone.

NEW PROCUREMENT AND PRODUCTION CHIEF

Brig. Gen. Walter G. Bain (left) last week succeeded Maj. Gen. Mark E. Bradley (right) in the top USAF procurement operating job, director of procurement and production for AMC. Bain moves up from chief of the Procurement Division, No. 2 post in AMC's procurement setup. Bradley is transferred to Paris to head supply and maintenance for United States Air Forces in Europe, under Gen. Lauris Norstad.

Nickel-Cadmium Batteries for Navy

Navy's Bureau of Aeronautics has placed a million dollar order for 2,000 nickel-cadmium aircraft batteries with a French firm. The order, signals the start of a trend away from conventional lead-acid battery for military aircraft, BuAer electronics officials claim.

BuAer, agency responsible for development of all military aircraft batteries, expects by June to receive its first shipment of nickel-cadmium batteries from the Societe Accumulateurs Fixes et de Traction, (SAFT) French battery firm of Romainville, France.

Navy officers expect that in the next two years the nickel-cadmium battery will replace lead-acid batteries in all military aircraft. By that time, an American manufacturer will be producing the French battery. Negotiations with several American manufacturers are at an advanced stage, BuAer reports, until an American firm begins producing the new battery, both types will be used interchangeably in military aircraft.

Air Force probably will adopt nickel-cadmium batteries for its aircraft within the next fiscal year.

▶ **Strongest Link**—Until now, the lead-acid battery has been the weakest part of an aircraft's electrical system, according to Marine Col. E. C. Best, director of BuAer's electronics division. The best lead-acid batteries are not serviceable beyond 100 hr. Therefore, it has been standard operating procedure for the military to buy three lead-acid batteries for each unit which they have installed.

There is a strong possibility, BuAer claimed, that the nickel-cadmium battery will last for the life of the airplane.

If so, it would become the strongest point in the aircraft's electrical system rather than the weakest, according to BuAer experts.

Decision to buy the French battery came after 15 months of intensive tests by the Bureau of Standards and in operational aircraft at the Navy's test station at Patuxent, Md. Nickel-cadmium batteries met all the Navy's specifications and, in some phases, exceeded all expectations.

Big advantage of the nickel-cadmium battery is that both the nickel and cadmium metals used in the 22-cell battery are 100% recoverable as salvage. BuAer officials claim that percentage of available supply of both these critical metals actually is less than the percentage of lead and rubber used in the lead-acid battery.

BuAer expects that nickel-cadmium batteries will be available commercially in a few years.

Newer Comets

- **First Mark 2 production versions on the line.**
- **And D-H has racked up 250 hours on prototype.**

By Nat McKitterick
(McGraw-Hill World News)

Hatfield, Herts—First two fuselages for production-type Comet 2s are now on the assembly floor at de Havilland Aircraft Co., Ltd.'s headquarters here. Two more are almost ready to be moved in from the fuselage shop nearby. By year's end D-H hopes to have four or five Comet 2s flying, ready for delivery to British Overseas Airways Corp.

Meanwhile, D-H test pilots have racked up 250 flying hours on the Comet prototype. In a few months it will be handed over to BOAC for route testing—"exploring the upper air over the North Atlantic," BOAC chairman Sir Miles Thomas says. But actually, BOACs first Comet 2 service will be between London and South American points, crossing the Atlantic at the narrowest point, between Dakar and Belem, Brazil. This service should start on schedule in early 1954.

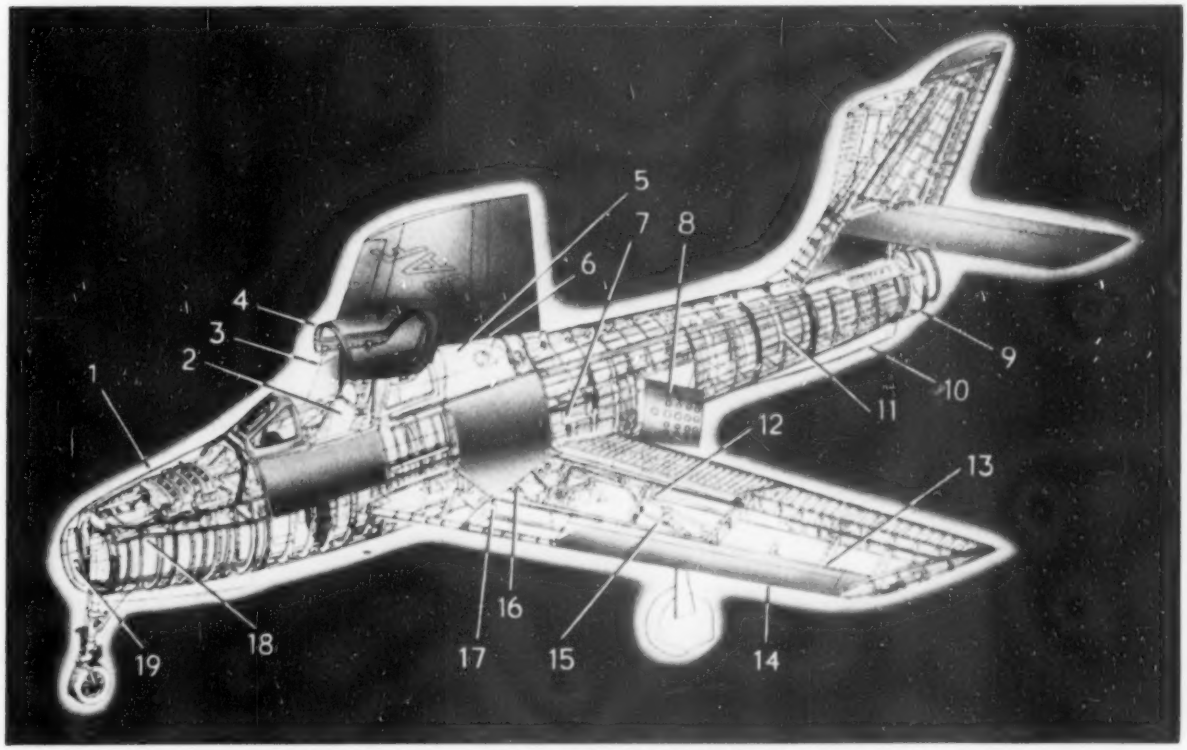
▶ **23 Firm Orders**—D-H has plans underway to lay down 45 Comet 2s—15 of them to be built at Short Bros. & Harland, Belfast, and another 15 at D-H plant at Chester. Another dozen can be built for delivery in 1955 or early 1956 if orders are forthcoming, D-H officials say.

Officially only 23 orders for Comet 2s have been announced so far: BOAC 12; Japan Air Lines 2; LAV (Venezuelan airlines) 2; Panair do Brasil 4, and British Commonwealth Pacific Airlines 3. De Havilland production plans indicate at least another 20 orders are in the talking stage. Canadian Pacific Airlines and UAT (French airline) are two likely customers, along with Air France.

To some extent, the advent of the Comet 3 has eclipsed Comet 2 prospects. Comet 3 production will monopolize D-H facilities beginning in the second half of 1956. The company claims orders for the Comet 3 already have booked up production until mid-1958. Since half a dozen Comet 3s are scheduled for production in 1956, 40 to 50 in 1957, and upwards of 70 in 1958, it is safe to assume that orders or options for the Comet 3 total more than 75 already. Only PanAm, with three on order and seven on option, and BOAC, with 10 on option, have announced orders so far.

▶ **Seek S. A. Sales**—D-H claims, however, that the Comet 2 has a real purpose, distinct from either the Series 1 or the Series 3. With a full payload range of 2,600 mi. as opposed to 1,730 mi. for the Series 1 and 3,000 mi. for the Series 3, the Comet 2 is designed for operators with long runs in relatively light traffic areas. South America is an obvious must for D-H Comet 2 salesmen.

As a production job the Comet 2 airframe isn't much different from the Comet 1. The fuselage is lengthened by three feet forward of the wing, boosting capacity from 36 seats to 44 seats. But the wing is much the same, saving small alterations needed to accommodate the Rolls-Royce Avon RA.9 (axial) jet instead of the D-H Ghost (centrifugal). Wing jigs that were used for Series 1 Comets already are being filled with stub wings and extension



CUTAWAY BARES REPUBLIC THUNDERSTREAK DETAILS

Skeleton view of the new Republic F-84F Thunderstreak fighter-bomber affords a close look at the plane's makeup. Noted in the drawing are: 1. Gun deck; 2. ejector seat; 3. canopy actuation arm; 4. cockpit canopy in open position; 5. fuel cells; 6. turtledeck cockpit enclosure; 7. shroud cooling duct; 8. perforated speed brake; 9. exhaust ejector assembly; 10. ventral fin; 11. tailpipe protective shroud; 12. forged rear spar; 13. forged ribs; 14. slat; 15. landing gear actuating cylinder; 16. inflight refueling installation; 17. forged front spar; 18. nose beam assembly and 19. air intake divider. Powerplant is a Wright J65 Sapphire turbojet of more than 7,200 lb. thrust. The sweptwing Thunderstreak is replacing the straightwing Thunderjets on Republic's assembly lines.

wings for the first two production Comet 2s.

Similarly, the Comet 2 prototype has undergone very little visible change during its development flying. Enlarged air intakes for the Avon have been tinkered with to find the best configuration. And, currently, the Comet 2 prototype sports a new experimental wing fence. The present Series 1 wing fence extends only a third of the way back from the leading edge and curves around the leading edge, ending up under the wing. The fences on the Comet prototype now extend across the wing from leading to trailing edge, but do not extend over the leading edge. D-H officials say this is just an experimental layout so far.

▶ **Comet Power**—The engine, of course, is the real difference between the Comet 2 and the Comet 1. The Comet 2's Avon RA.9 is the civil development of the Avon RA.3, rated by Rolls at 6,500 lb. thrust. D-H follows a very conservative policy on engine ratings and is still quoting 6,500 lb. for the RA.9. But the engine must be delivering at least 7,000 lb. thrust now. The Avon RA.7, which is the military development of the RA.3 and which will power the Vickers Swift and some Hawker Hunter "super-priority" jet fighters, passed a 7,500-lb.-type test many months ago and recently passed a 9,500-lb.-type test with afterburning.

This month at Hatfield, workmen were bolting on the wings of the last Series 1 Comet, Number 23, a 1A earmarked for Air France. Ghost engines were being fitted into Numbers 20 and 21, also earmarked for Air France. On the strip outside were two Series 1A Comets with RCAF markings and CPA's second Comet 1A. CPA's first Comet crashed on takeoff at Karachi last month. Rumor has it that CPA hopes to replace the loss with one of the RCAF Comets. But no such orders have been received here.

Besides the trio for Air France, only one other Series 1A Comet remains uncompleted—a third order for UAT of France, now being painted in preparation for its first flight. By Farnborough time this year Series 1 production will be pretty much a thing of the past at Hatfield, and Series 2 production in full swing.

Navy Grants PAA Jet Stream Contract

In an attempt to compile detailed data on the high-altitude jet stream which sweeps eastward across the Pacific at speeds up to 250 mph., the Navy has granted Pan American World Airways a contract to conduct a long-range study of the meteorological phenomena.

Such a study will permit more accurate understanding of these winds and allow for more efficient commercial and military aircraft operation. Data will be compiled on structure, location and daily changes in the stream. The project is sponsored under contract N189s-90981 BuAer project AROWA (applied research; operational weather analyses) based at Norfolk Naval Air Station, Va. Length of the PAA contract is for at least 27 months.

The carrier already has amassed considerable experience in riding the jet stream eastward. Its Clippers are now flying the 3,900-mi. run from Tokyo to Honolulu nonstop, bypassing the Wake Island fuel stop and clipping seven hours and 400 mi. from previous flight schedules.

PAA's project engineers on the Navy contract will be Carol C. Beamer and Sidney M. Serebreny.

Airport Funds

- **Mayors fight proposed cut of program's budget.**
- **Cities threaten to ban military from civil fields.**

A potentially strong grass-roots appeal to individual congressmen to keep the Civil Aeronautics Administration national airport program in the budget was touched off last week in Washington by the U. S. Conference of Mayors.

The conference—representing mayors of all principal U. S. cities—transmitted a report to every member of the House and Senate, urging the need for construction of 2,232 new municipal airports and improvements to 2,583 existing airports in the next three years.

Individual mayors also are starting to appeal to the congressmen in their areas in an effort to counteract the reported intention of Commerce Secretary Sinclair Weeks to slash the long-term airport program, already well behind its original schedule.

The mayors' report shows that approximately $150 million already earmarked for airport improvements by 362 municipalities is waiting for matching federal airport funds, promised under the $500-million airport program authorized by Congress in 1946. Actually, only $200 million of the authorized $500 million has been appropriated.

▶ **Ban Military**—Paul V. Bettors, executive director of the U. S. Conference of Mayors, told AVIATION WEEK that many local communities are angry about the federal delay in airport improvements and are blaming the military for failing to support the civil airport expansion program.

Serious consideration is being given in many of the communities to refusing the right of military operations on their civil airports, he said.

Some individual cities have raised as much as $3 million under bond issues to carry out necessary airport improvements and are stymied by the failure of Congress to appropriate matching federal funds, the report said.

▶ **Save Dollars**—Value of the civil airports as military facilities in case of emergency was emphasized by the mayors' conference.

During World War II 429 civil airports were turned over to military operation and saved the U. S. many millions of dollars by facilitating movement of priority passengers and materials, the report states.

Today, airport facilities and the airplanes they serve are expediting U. S. defense factory production lines all over the nation by rushing supplies to ease emergency shortages, the report said.

Also, military use of civil airports is increasing steadily as indicated by last available figures on landings, and takeoffs at civil airports with CAA control towers. Of 16.6 million landings and takeoffs in 1952, 2,840,047 were military planes, an increase of approximately 200,000 operations from 1951 and the largest military operation figure since 1945 at the end of World War II.

Navy Orders Convair R3Y-1 Flying Boats

Navy expects to operate a trans-Pacific transport service next year with a fleet of Convair R3Y-1 Tradewind flying boats, according to Joseph T. McNarney, Convair president. Navy has ordered 12 Tradewinds and expects to assign them to its Fleet Logistics Air Wings operating from Alameda, Calif.

The R3Y-1 incorporates several major structural modifications from the XP5-1 prototype, originally designed as a patrol bomber. They include:

- **New engine nacelles** for the Allison T40 turboprops that permit shorter driveshafts connecting the twin-power sections to the contra-rotating Aeroproducts propellers. Tailpipes that formerly extended aft of the wing also have been shortened.
- **Reinforced wing floats** that utilize a V-shaped brace to supplement the single vertical strut linking the float with the outer wing panels.
- **Large cargo loading door** to facilitate handling bulky cargo.

The giant flying boat transports are designed to cruise at 300 mph. on long-range hauls and have a top design speed of 350 mph. The R3Y is equipped with rearward-facing seats, cabin pressurization and air conditioning.

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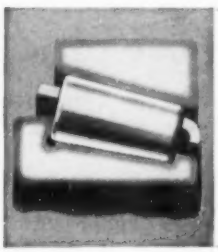

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BEECH T-34A Mentor has been ordered into quantity production by Air Force.

AF Orders 500 Beech Trainers

Orders for approximately 500 Beech T-34A Mentor primary trainer airplanes have been divided by the USAF between Beech Aircraft Corp., Wichita, and the Canadian Car and Foundry Co., Ft. William, Ont. (Contract award was forecast in AVIATION WEEK Industry Observer Feb. 23). Pentagon sources indicate Beech received about three-fifths of the total order.

Air Force spokesmen say the tricycle-gear tandem plane will replace the World War II-vintage North American T-6 Texan primary trainer, indicating additional T-34 orders will increase the total well beyond the original 500.

► **Performance Details**—The Beech airplane is powered by a 225-hp. Continental O-470A six-cylinder engine, a new powerplant also specified for Cessna's new civilian four-place Model 180 and twin-engine Model 318.

For the trainer, Beech quotes a 180-mph. top speed, a 20,000-ft. service ceiling and 785-mi. range. With a design safety factor of 10, the airplane has no acrobatic restrictions. Gross takeoff weight is 2,900 lb. Wingspan is 32 ft. 10 in. and length is 25 ft. 11 in.

► **AF Modifications**—Prototype Beech Model 45 Mentor, developed from the commercial Bonanza, was first flown Dec. 2, 1948. The model finally purchased, however, has a higher-powered engine, standard Air Force-Navy accessories, a 24-volt system, special air conditioning equipment and instrumentation, and other changes from the prototype.

Purchase of the Mentor ends competition between Fairchild, Temco and Beech for the trainer contract, which started shortly after World War II.

Nyrop Heads Local Service Association

Former Civil Aeronautics Board chairman Donald Nyrop has been appointed director of the new Conference of Local Airlines, a council-type association of the 14 local service airlines. The new organization is affiliated informally with the Air Transport Assn., of which the carriers also are members.

Local service airlines consider 1953 a critical year for their industry. They naturally fear that the Republican economy drive may clip their subsidy support, now totaling $20 million annually.

Nyrop said his major projects now are:

• **Subsidy legislation.** He will seek equitable treatment for local service lines in the various bills proposing separation of subsidy appropriations from Post Office mail pay.

• **Mail compensation.** Local lines want compensatory mail pay to cover cost of handling small lots of mail. CAB started a "multi-element mail-rate study" a year ago, investigating this shorthaul, small-lot problem.

• **Development financing.** Nyrop will work on various proposed ways to help local airlines finance a modern prototype aircraft design to replace the obsolescent DC-3. Each year, Congress or Budget Bureau has killed CAA appropriation requests under the prototype testing authorization of 1950. And proposals to subsidize prototype construction have not passed Congress.

• **Long-term certificates.** Nyrop will press the local lines' plea that the Board grant longer certificate terms than the present five- and seven-year franchises. The insecurity of short-term certificates for the subsidy-dependent local service industry makes financing difficult.

Nyrop finalized his program at a re-

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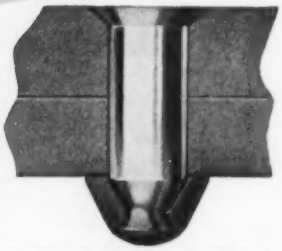

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HS 28	Flat Binding Head—Close Tolerance Shank
HS 37	Close Tolerance 100° Countersunk Head—Close Tolerance Shank—Minimum Tensile Strength 160,000 p.s.i.
HS 38	Flat Binding Head—Close Tolerance Shank—Minimum Tensile Strength 160,000 p.s.i.
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SCREWS BOLTS NUTS

cent meeting in Chicago with the executive committee of the Conference of Local Airlines—Mohawk executive vice-president Robert Peach, Frontier executive vice president C. A. Myhre and Trans-Texas president R. E. McKaughan.

Nyrop has joined the Washington law firm of Klagsbrunn, Hanes & Irwin and will operate his CLA affairs from offices in the Ring Bldg.

ATA will continue handling technical and business affairs common to trunklines and local lines alike, and Nyrop at times will work with ATA counsel Stuart Tipton on political and legal affairs of the certificated airlines.

NATO Aircraft

- **Contract terms near on Hawker, Mystere buying.**
- **Italian plants may make Gloster Javelin fighter.**

By Ross Hazeltine
(McGraw-Hill World News)

Paris—Long negotiations for U. S. off-shore purchase of European-made fighter planes for NATO forces now are virtually completed and first contracts are expected to be signed soon.

Military and Mutual Security Agency officials concerned with the year-long negotiations say terms of contracts are fully agreed for purchase of $69 million worth of Britain's Hawker Hunters and $86 million worth of France's Marcel Dassault Mystere 4s.

U. S. officials also are nearing agreement with Fiat and other Italian manufacturers for the purchase of $25 million worth of British Gloster Javelin night fighters to be built in Italy under license. One official reports that this agreement is now about 85% complete.

▶**More Hunters**—The fourth largest U. S. aircraft purchase order under consideration is for $40 million worth of British Hawker Hunters, to be built jointly by Belgium and Holland. The Dutch firm, Fokker, would build airframes, and Belgian firms would supply engines, probably Avons.

U. S. purchases of military aircraft in Europe are part of a NATO-approved $400-million aircraft production program designed to build up European industry and supply the latest type fighters for NATO forces. The U. S. pledged aircraft purchases totaling $225 million, and European Nations are committed to provide the equivalent of $175 million. The program is expected to produce about 1,200 planes.

Firm dates have not yet been fixed

Engineers inspect latest models (mock-ups) of G-E air turbine drives—turbo alternator drive left, turbo hydraulic pump right

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for signing of the Hunter and Mystere contracts, but officials say both certainly will be signed "within weeks," possibly about the end of this month. The Italian and Benelux contracts will take longer, but all four contracts will be signed before June 30, deadline for commitment of U. S. aid funds for this fiscal year.

▶ **1955 Deadline**—U. S. law requires that equipment purchased from this year's appropriations must be delivered before June 30, 1955. That requirement presented one of the biggest obstacles to contract negotiation, because such fast delivery is impossible in the case of both Britain and France, while Benelux and Italian production will be still slower.

Aid officials decided, however, to go ahead with signing of the contracts and work out delivery technicalities later. If possible, Congress may be asked to change the law, and numerous other legal ways of meeting this requirement are under consideration. In France, for example, the U. S. could accept delivery of 150 Mystere 2s, which are ready for production under French government order, and trade them back to France for Mystere 4s when production of that plane amounts to a total of a few more than the 300 expected from the U. S. order. A similar technique could be applied in Britain.

The U. S. off-shore aircraft purchasing program is intended to stimulate production of badly-needed supersonic fighters for NATO. But—more important in the long run—it also provides impetus for the development of an integrated European aircraft industry that will be a more solid and efficient production base for European air power than present uncoordinated national industries.

ROUTE EXTENSIONS proposed by Bonanza are shown by broken lines in above chart.

Bonanza Asks for New Routes

Bonanza Air Lines asked the Civil Aeronautics Board for four new route extensions this month at a pre-hearing conference on renewal of the carrier's present routes.

Washington observers foresee no trouble with the route renewal but expect strong controversy on the proposed route additions.

Bonanza asks these new routes:

- **Reno-San Francisco** via Stockton and Oakland.
- **Las Vegas-San Diego** via Indio.
- **Las Vegas-Los Angeles** via Inyokern and Bakersfield.
- **Blythe-Los Angeles** via Indio and Ontario.

To gain these routes, Bonanza probably must convince CAB they will be at least as economic as its present routes and would be better added to Bonanza than to other carriers.

Since CAB's recent approval of Central Airlines' certificate, observers are predicting almost certain renewal for those local service lines whose operations are subsidized considerably less than Central's. Bonanza's mail rate is among the lowest for local lines, and its annual subsidy is under $1 million.

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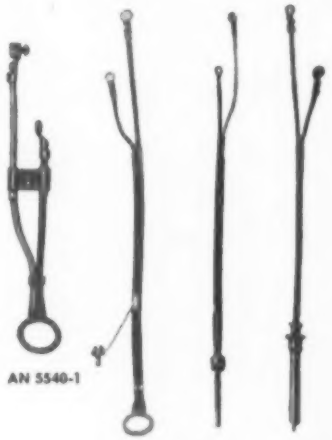

AN5540-1 18 MM. iron-constantan Sparkplug-gasket type thermocouple for measuring cylinder-head temperatures. Also available in copper-constantan and in 14 MM size for either material.

AN5540-2 Iron Constantan Sparkplug-gasket type with copper ring for 18 MM plugs. Wire guard and supporting bracket are stainless steel and conductors are protected with flexible heat-resistant sleeving. AN5539 terminals are silver-soldered to leads.

AN5541-1 Iron Constantan Bayonet Type thermocouple with junction located in silver tip. Spring used with this thermocouple will retain its strength despite high temperatures.

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How American Helicopter saves 66% in weight of these critical fastenings

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Senators Push Mail Subsidy Separation

A bipartisan group of 19 senators has opened a push for Sen. John Kennedy's airmail subsidy separation bill, despite Air Transport Assn.'s opposition to consideration of the measure at this session of Congress.

ATA vigorously opposes the bill on grounds that Civil Aeronautics Board's "administrative separation" now discloses the amount of airmail compensation earmarked as subsidy and that there is little point in legislation requiring that subsidy be paid out of a special account, instead of as airmail.

The association particularly opposes these two provisions of the Kennedy bill:

- The requirement that airmail pay be based on cost-of-service, plus a fair return. The industry favors a "fair and reasonable" yardstick for determining mail pay.
- The provision making certificated freight carriers, as well as mail-carrying airlines, eligible for subsidy in the commerce or national defense interests.

The six Republican senators joining Kennedy as co-sponsors are: Guy Cordon, Homer Ferguson, Irving Ives, William Langer, Karl Mundt, and Alexander Smith.

The 12 other Democratic sponsors are: Earle Clements, Paul Douglas, Guy Gillette, Thomas Hennings, Hubert Humphrey, Olin Johnson, Estes Kefauver, Harlev Kilgore, Herbert Lehman, Mike Mansfield, James Murray and John Sparkman.

Introducing the measure, Kennedy stated:

"Our bill provides that in the future, airlines will be paid . . . compensation for carrying the U.S. mails at a rate not to exceed the cost of services actually rendered by those airlines, plus a fair return. Anything over and above this mail compensation will have to be a direct subsidy, out in the open instead of hidden, and charged to the Civil Aeronautics Board instead of to the Post Office. These subsidies will have to be reviewed each fiscal year by the Congress, as was specifically recommended by the Hoover Commission.

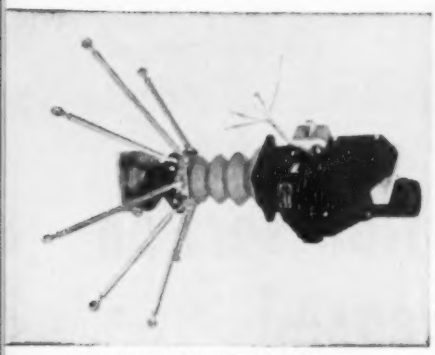
"Our bill increases the emphasis on national defense instead of deficits as the standard for granting subsidy."

Rome Has Airport Trouble

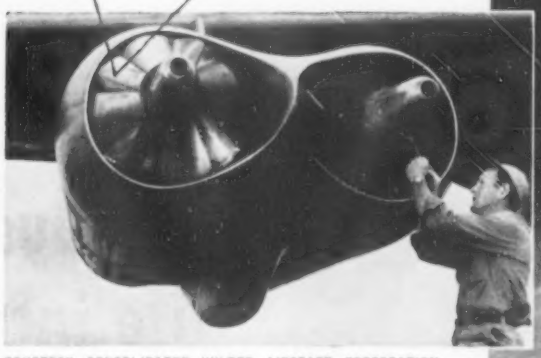
(McGraw-Hill World News)

Rome—Construction of Italy's $25-million Intercontinental Airport here is being delayed by protests that aircraft taking off and landing at the new airfield would endanger residents of nearby coastal resort towns.

To assure instant operation of jet assist engine air intake doors under icing conditions



COURTESY LEAR INCORPORATED



COURTESY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

SILASTIC*

where other materials fail!

Auxiliary jet engines are fitted with aluminum air intake doors which close to reduce drag when not in use, and open when the engines are summoned for extra bursts of power at take off or in flight.

These doors must always respond to the pilot's instant command on the ground, at sub-zero altitudes or under icing conditions.

This requirement was met by embedding heating elements in a piece of Silastic sandwiched between two sheets of aluminum that are shaped to form the door segments. The Silastic insulates the heating element; withstands surface temperatures up to 450°F, and conducts heat rapidly to the aluminum intake doors.

These doors are opened and closed by means of an actuator and screw jack assembly. To prevent dirt and ice from fouling the screw jack, exposed sections are encased in a heat resistant Silastic bellows that retains its flexibility at temperatures down to —100°F.

In designing this anti-icing assembly, Silastic proved to be the only material that remained resilient and serviceable after continuous vibration and repeated exposure to temperatures ranging from —100°F to +450°F.

Such performance is typical of Silastic, the Dow Corning silicone rubber. When you need a material that will remain rubbery and retain its excellent dielectric properties after long exposure to temperatures from below —70° to above 500°F, or after prolonged weathering or contact with a variety of hot oils and chemicals, ***specify Silastic.***

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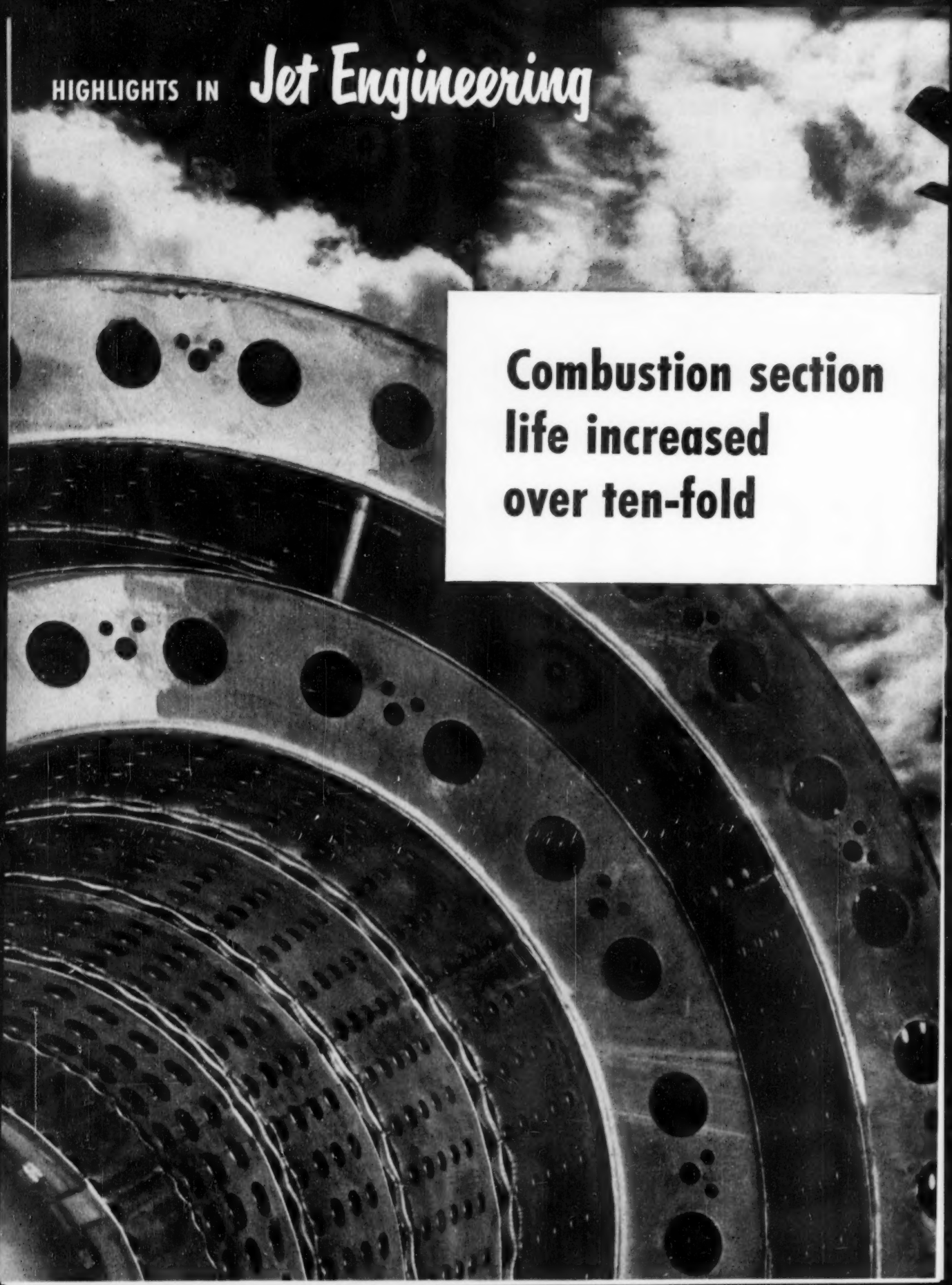
HIGHLIGHTS IN *Jet Engineering*

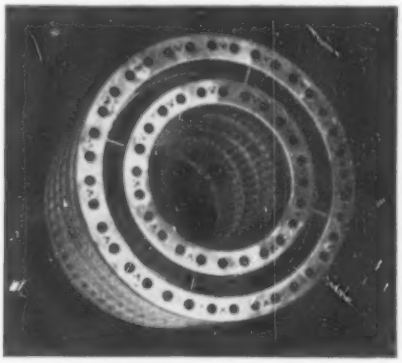


Combustion section life increased over ten-fold

The combustion section of jet engines was given an unprecedented lease on service life with the introduction of the "step wall" liner. The unique design of this combustion chamber liner has proved itself beyond question in the unequaled combat record of the Westinghouse J34 engine. By eliminating severe hot spots and their heavy engine damages, the liner answered one of the most critical of all service-life problems.

The actual design features of the "step wall" liner, a Westinghouse patent, stand out at a glance. In place of the usual cylindrical sheet metal construction, telescopic circular sections have been fitted together. This gives the liner a stepped contour, instead of a flat surface, allowing a continuous blanket of relatively cool air to pass over its surface. The result: protection from the ravages of temperatures over 3000°F.

While the J34 was setting its unparalleled combat records in Korea, Westinghouse engineers were designing another new jet engine, using the "step wall" liner—the J40. Already severe altitude and wind-tunnel tests have been made. Again new records have been set . . . over 700 hours without a major component change. And again Westinghouse engineers have new designs on their drawing boards . . . new plans to keep advancing the jet engineering of today, with an eye to faster, more economical air transportation tomorrow. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-54015



"Step Wall" Liner—Full view of combustion chamber liner shows stepped contour design on both inside and outside sections.

YOU CAN BE **SURE**...IF IT'S

Westinghouse

CLIMBING AWAY, the Ilyushin 28 attack bomber shows recognition features of straight wing and swept tail in this official AF model.

Curtain Is Raised on Red Ilyushin Jets

Authentic report on new Russian twin-jet series is based on 2-year study in Germany for Aviation Week.

Sergei Ilyushin's 26th design may be the next Russian-built plane to blast out of the privileged sanctuary north of the Yalu and head south to do battle.

Now being stockpiled in ominous quantity by the Red Chinese at their complex of Manchurian bases, the sleek twin-jet craft serves a triple purpose:

- **All-weather fighter (Il-26),** equipped with radar and in a performance class a couple of grades below the MiG.
- **Light attack bomber (Il-28),** capable of toting tactical atomic weapons or giving close support to ground troops.
- **Twin-jet trainer (Il-27)** for either version.

Presence of the Il-28 bombers in Manchuria was reported by Gen. Hoyt S. Vandenberg, USAF Chief of Staff, late last year. He said that he presumed Chinese pilots were being trained in the twin-jet bombers (AVIATION WEEK Dec. 15, 1952, p. 16). Earlier, Thomas K. Finletter, then Secretary of the Air Force, had stated that as many as 300 to 400 of the planes had been sent to Siberia from Russia in the fall.

► **Performance**—Estimates of the top speed of the Il-26 and its brothers vary from a low of about 530 mph. to a high of 650 mph. Knowing the impossibility of assessing such an intangible without complicated flight-test equipment, we can assume the plane is in the 600-mph. class and let it go at that.

Landing speed is reported as remarkably slow, down around 90 mph.

At takeoff, the engines are started without the use of the external battery cart. At full static thrust, there is light smoke from the engines. Start of takeoff roll is very slow, but acceleration improves considerably as the plane runs down the strip.

The plane is airborne after rolling about 3,000 ft. Initial climbs observed have been very slow; in one case, the plane took a clocked three-and-one half minutes to get to an altitude estimated at about 700 ft.

Main wheels are retracted and doors closed by the three-minute mark. At about four minutes, the plane is up to an estimated 3,000 ft.

► **Shape of the Bird**—Ilyushin's design is a twin-jet layout featuring a shoulder-height wing of moderate aspect ratio. The wing leading edge is straight, which means technically that the wing

How We Got It

This report on a contemporary Russian design—the Ilyushin 26—is the result of over two years of painstaking observations made behind the Iron Curtain for Aviation Week.

The man who made the detailed notes and sketches that are the basis for this article is a thorough, competent observer. He has seen and photographed the aircraft in flight over his town and on the ground at nearby airbases. He has been able to examine crashed specimens. He has made trips to distant airfields to confirm reports of the craft sent him by others.

Out of these dangerous missions has come this analysis. It is not a nebulous description extrapolated from one or two random sightings and rushed into print. Instead, it is a carefully weighed summary of many bits and pieces of data, and is as accurate as it is possible to be at this time.

is actually swept forward by a slight amount.

In contrast, horizontal and vertical tail surfaces are swept.

The fuselage is circular in section; differences in the three versions are to be seen as changes in the nose section. On the all-weather fighter, the nose is solid with an obvious radome. The bomber has a conventional glassed-in section, and the trainer is recognized by tandem and separate cockpit positions.

Jet engine nacelles are slim and located about one-third out along the wing span. Each nacelle carries the single-leg of the main landing gear wheels. The nose gear is a double-wheel type and is mounted well forward on the fuselage.

Armament varies; some versions have been seen with rocket racks or bomb racks. Apparently there is a pair of forward-firing fixed cannon, and a tail turret with another pair of cannon.

Originally unpainted, the Il-26 series is now appearing with gray-green camouflage on the top and blue-white undersurfaces. The red star insignia has the usual white border, and black numerals identify the planes.

► **Premier Showing**—In the spring of 1951, well over a year after the first MiGs had been seen cavorting around the skies over Berlin, a new twin-jet craft made its appearance. The word shortly got around that three squadrons of the type had been stationed on the airfield at Oranienburg, north of Berlin.

The plane apparently was new to others beside the Berliners, because no formation flying was observed. In the squadron mass flights, "each plane flew his own way." This was the bomber version.

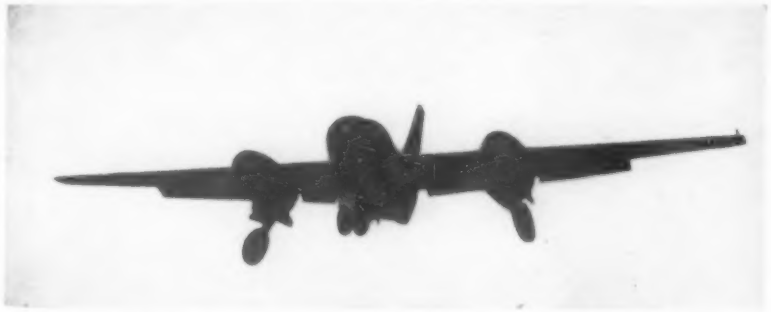
The trainer had not yet made its debut, and so the squadrons at Oranienburg used an elderly North American B-25 left over from Lend-Lease. The reason cited by the observer was that until then, Red bomber pilots had trained on the old Pe-2 and Tu-2 types which were not equipped with tricycle gear. The B-25 was the first plane available to them with the new landing gear.

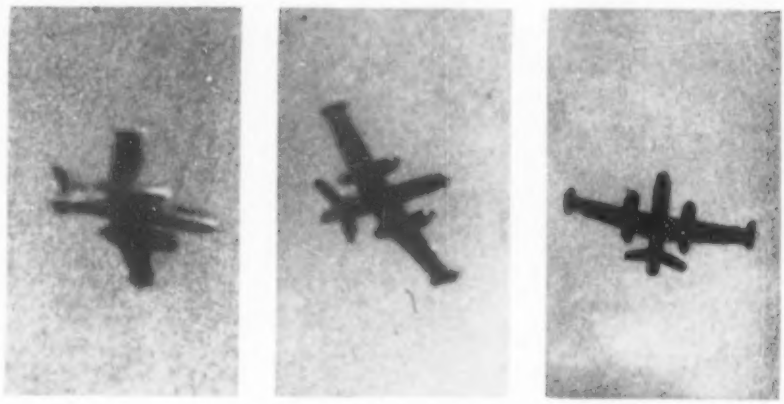
Later in the year, pilot techniques improved, and by the fall of 1951 closed formations of the twin-jet plane were seen almost daily.

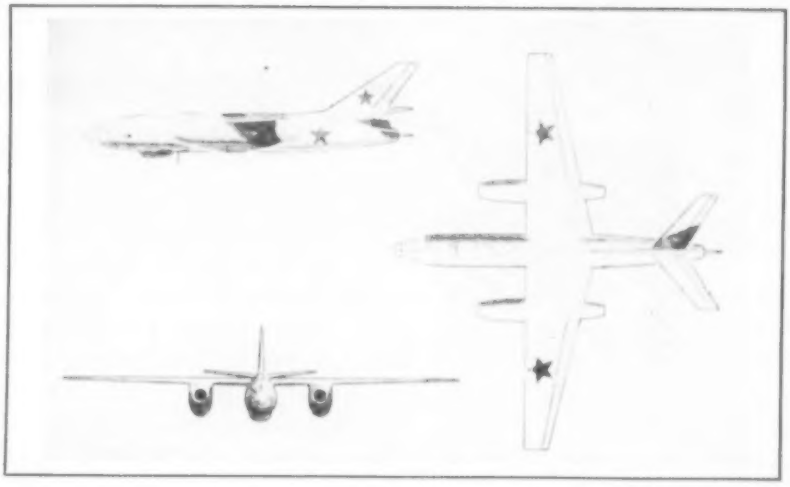
► **Intelligence**—By this time, the first reports of this new design had been turned into elaborate cutaway drawings and design analyses for the aviation press. In each of these, the credit was given to senior Soviet designer Andrei Tupolev.

But by the spring of 1952, it had become generally accepted that the design was the work of Ilyushin. He had become famous for his development of the famed "Stormovik," called

Recognition Photographs and Three-View







"Iron Ivan" by the German troops, a World War II plane designed for the specific job of close support and ground attack.

There was also some question about the engines. First reports had them spotted as axial-flow types, because of the length of the nacelles. Later observations stated that centrifugal types were fitted.

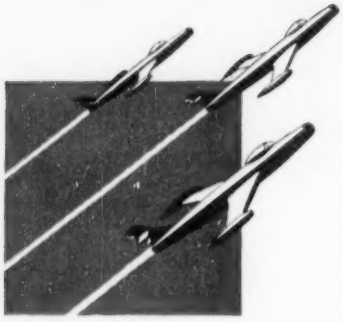
AVIATION WEEK's source has seen the plane with nacelle doors open on a number of occasions, and he states that the engine is an axial-flow unit.

► **More Observations**—There was no bad-weather flying attempted by the Red pilots during 1951. In the spring of 1952 the first night-flying efforts began and since then formations have been spotted frequently on night exercises.

At about the time night-flying began, the Il series started to show in colors instead of the unpainted metal finish.

Shortly after, during the summer of 1952, all the planes were withdrawn from Oranienburg. In later months, units were pulled out from all over Germany. It was at the end of 1952 that the first reports of Communist air buildup came out of Korea. According to year-end intelligence estimates, there

PHOTO COURTESY BOEING AIRPLANE COMPANY



Fighting corrosion before it starts

Corrosion and airplanes just don't go together—especially not when aircraft is flying faster than sound, where every stress and every strain is magnified to far greater significance than ever before.

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To help aircraft manufacturers in their continuing war on metal corrosion, 3M developed EC-843—a sprayable coating that sets as a tough, flexible film which protects flat surfaces, joints, and even dissimilar metal splices against the effects of corrosion.

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are more than 100 of these jet bombers based north of the Yalu River in Manchuria.

► **Details**—Unfortunately it is not possible to give a complete analysis of what this plane looks like under its skin. The three-view drawing shows the major physical characteristics of the airplane, and any competent engineer can "guesstimate" the kind of structure that could be used. In appearance, the Ilyushin design is completely conventional and it is probably built the same way.

(Detailed study of a semi-intact MiG proved that the Russians—as of 1948—were building fighter aircraft in a conventional manner. The major difference was the use of steel at points where high loads were carried.)

It is interesting to note the details of the landing gear. The main wheels are single and mounted on structure which ties in the engine mount and main wing spar as well. On the ground, wheels and struts slant outward from a vertical line through the nacelle, giving the plane a queer straddling appearance.

The main wheels retract forward into the nacelle, and rotate through 90 degrees to lie flat near the underside of the engine. Four nacelle doors close in the wheel and strut after retraction; ahead of and behind these doors are fixed fairings which complete a smooth aerodynamic closure over the landing gear.

The nose gear is double-wheeled and retracts aft without rotation into the fuselage belly. Three doors—a large single unit forward and a smaller, longer pair aft—cover the nose-gear well. The single door is hinged at the leading edge and swings down and forward when the wheels come out. The smaller doors are hinged along the outboard edges and open out.

► **Nacelles**—Forward of the wing leading edge, the entire covering of the jet nacelles consists of removable panels. There are two small fairings toward the end of the nacelle on either side; these are thought to cover actuating gear for a two-position tailpipe nozzle for use during afterburning.

The tail turret is not a remote type. It is aimed and fired by a gunner (who must be extremely cramped, says our observer). The cannon are mounted in a ball-and-socket arrangement, similar to many power-operated types currently in use. The gunner sights his cannon through a multi-paned window. His escape door is at his right. The trainer Il-27 does not have this position, but instead uses a closed-in tailcone.

► **Fuel Location**—One of the peculiar features of the Il series is the tiny tip tanks. These show in some of the photographs on page 31, and appear to be extremely small. Apparently they are not jettisonable, but hung on as auxiliary fuel units. They are used quite frequently on the planes which have been seen.

Main tanks of the Il series are apparently between nacelles and fuselage. These planes have been observed during the fueling process and are filled through an inlet on the upper surface of the wing between nacelle and fuselage.

Without tip tanks, the span of the Il-26 is approximately 68 ft.; with the tanks, this increases to 72 ft.

Fuselage length is 60 ft., not counting the overhang of the rear cannon.

—DAA

Fairchild Builds F3H Tools for Luscombe

Tooling for the McDonnell F3H Demon's outer wing panels to be fabricated by Luscombe Airplane Corp. will be built by Fairchild Engine and Aircraft Corp.'s Aircraft Division.

The contract with Luscombe calls for immediate development of necessary tooling ability and increased capacity to the extent of about 100 employes. Fairchild is establishing extensive schooling and familiarization programs for the necessary employes.

In the manufacture of tools for the F3H wing, Fairchild will use the company-developed coordinate setting machine.

Engineer Union Plans Expansion

Plans for expansion of the Engineers and Scientists of America, now numbering 40,000 members, were the major item of business of ESA's first national convention last month in Los Angeles.

The 35 delegates who attended represented 10 collective bargaining groups. ESA expects that four more units will come in by July of this year. And the organization wants to include the rest of the 400,000 eligible employed engineers and scientists.

► **On the Record**—ESA plans to present its position on Taft-Hartley Act to Congress this month after going on record with that position at the convention. The stand: Continuance of the professional employe provisions of the act which guarantee the choice of separate collective bargaining units for professional engineers and scientists.

ESA also will hold that the definition of supervisor in the act should be amended to include only those with true management functions.

It will push for full bargaining rights for governmental employes and legally guaranteed overtime benefits for more engineers and scientists.

President for the coming year is Joseph Amann, senior process engineer with Minneapolis-Honeywell Regulator Co. Other officers: John Taft, Westbury, N. Y., vice president; Orville Underwood, Minneapolis, secretary; Lloyd Sruman, Seattle, treasurer; Arthur Marin, Newark, N. J., and George Stosskopf Los Angeles, executive committee.

Amann has listed three major tasks for member group bargaining:

• **Provide equitable compensation** for engineers and scientists based on their contributions to society.

• **Remove inequities** based on the declining value placed on experience.

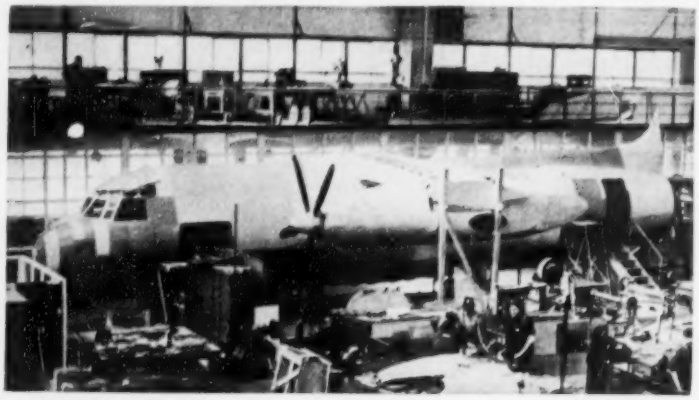
• **Provide sufficient overtime compensation** so that employers will stop using engineering overtime as a money-saving device for poor planning.

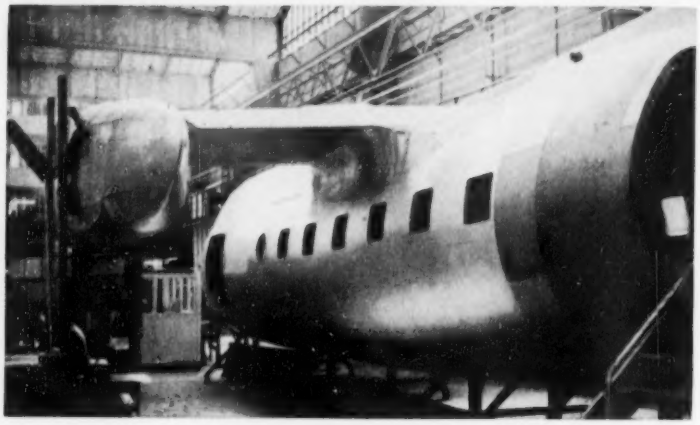
► **Membership**—The member groups of

CANADIAN JETS AHEAD OF SCHEDULE

The 45 Avro Canada Orenda turbojet engines ready for shipment in the picture above are only part of a month's production of the company's Malton, Ont., plant. These engines are going into Avro Canada's twin-jet all-weather CF-100. Deliveries already have been made, two months ahead of schedule, for Canadair-built F-86 fighters.

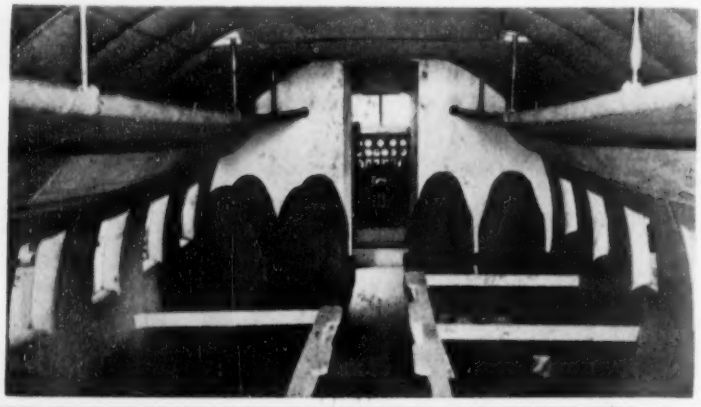
Aviation Week Picture Brief





Fokker Turboprop Mockup

The full-size wooden mockup of Fokker's new F.27 Friendship turboprop transport is seen in these views taken in the company's shops at Amsterdam, The Netherlands. The views above detail the highwing configuration and engine placement; below is the cabin interior facing the cockpit. Note the rearward seating arrangement. Engine mockup is fitted with a five-bladed prop. Friendship is being pushed as a DC-3 replacement. Powerplants are Rolls-Royce Darts, although 1,525-hp. Wright Cyclones may also be fitted. The Dutch government has ordered prototypes of the F.27 and the craft has also been studied by Fairchild Engine & Airplane Corp., which has U. S. license for several Fokker designs. A cargo version of the F.27 is planned.



ESA are: Minneapolis Federation of Honeywell Engineers (Minneapolis-Honeywell Regulator Co.); Association of Professional Engineering Personnel (RCA Victor Division); Engineers Assn. (Sperry Gyroscope Co.); Engineers and Architects Assn. (Lockheed, Convair, City and County of Los Angeles, Rheem Manufacturing); Engineers Assn. of Arma (Arma Corp.); San Francisco Area Group Professional Employees (Pacific Gas & Electric, Western Assn. of Engineers, Architects and Surveyors); TVA Engineers Assn. (Tennessee Valley Authority); Seattle Professional Engineering Employees Assn. (Boeing); Council of Western Electric Techincal Employees – National (Western Electric); and Engineers Guild of Oregon (Oregon).

Jacobs to Develop 1-Piece Rotor Blade

A development contract for a one-piece extruded aluminum helicopter and convertiplane blade has been awarded to Jacobs Aircraft Engine Co. by the Wright Air Development Center, USAF Air Research and Development Command.

The Pottstown, Pa., firm will design, engineer, ground- and flight-test the blade; production of the unit will be at the Phoenix, Ariz., plant of Reynolds Metals Co.

Advantages claimed for the blade by H. E. Lemont, Jacobs' chief engineer-development:

- **Superior structural integrity** without joints that might weaken the blade.
- **Excellent aerodynamic characteristics** –about 7% more lift for the same power than current contemporary wooden or wood-fabric covered blades.
- **Lower cost,** with the estimated figure at about 10% the cost of present-day blades in production. Lemont says that it appears it will be cheaper to throw the blades away in the event of minor damage than to repair them.

Flight tests are to be made "in the near future" on the Jacobs Model 104 Convertiplane.

Meter Uses Sound to Gauge Fluid Flow

A new type of flowmeter, which uses phase comparisons of sound waves as its basic principle, has been developed at the National Bureau of Standards.

Very fast response is claimed for the device, and the Bureau says that extremely small velocities of flow can be measured with the unit. There is no obstruction of the fluid flow by the metering.

Flowmeters have been used for some

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-but every hit direct!

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"BOMBING THROUGH OVERCAST"! Yet RCA SHORAN can determine your position "over target" to an accuracy of better than 50 feet in 100 miles or more—*and do it in less time than it takes to tell it!*

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Just one example of how RCA is working with our Armed Forces to assure U. S. supremacy in electronic equipment.

You, too, can help our Armed Forces keep our country safe. The U. S. Air Force urgently needs men and women volunteers to spot enemy aircraft—man Air Defense filter centers—do the many jobs as part of the Air Defense team. 200,000 patriotic Americans are serving. 300,000 more are needed.

JOIN NOW! Contact your nearest local Civil Defense Director. Or write to: Ground Observer Corps, U. S. Air Force, Washington 25, D. C.

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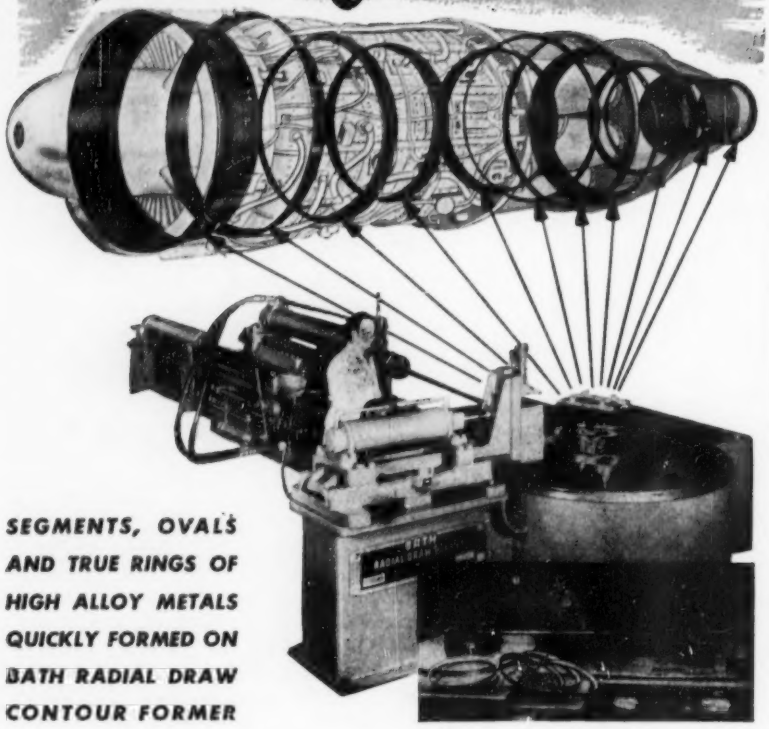

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time to measure the flow of fuels on engine test stands, for example. This new device, which the Bureau claims can measure the air currents in a still room as well as the rapid flow of fluids in pipes, would seem to have numerous applications in aviation. A possible use is the measurement of air mass flow in a ramjet or combustion chamber test rig.

► **Principle**—In operation, a sound wave is transmitted through the flowing fluid, and a phase comparison is made between received and transmitted wave.

The sound energy is sent and received through the walls of the containing vessel. No part of the measuring system ever comes into direct contact with the medium being studied.

The transmitter and receiver units of this new flowmeter are exchanged periodically without varying their location. This is done by using identical units as transmitter and receiver, and by switching their connections alternately to the receiving and transmitting channels of the system.

A phasemeter displays two phase shifts alternately, one a function of the sound velocity plus the fluid flow and the other a function of the sound velocity minus the fluid flow. The difference between these phase shifts is a measure of the velocity of the fluid.

► **Reason for Response**—The switching operation between transmitter and receiver can be made to operate faster than the inherent variations in either unit or the medium being measured. In the first NBS experimental model, the mechanical switching unit is used to give a 10-cps. rate.

By using vacuum tubes, this switching frequency could be increased considerably, and the time of response could be correspondingly shortened.

The phasemeter output is applied through an electronic high-impedance voltmeter, which can be calibrated directly in terms of velocity. Rapid changes in velocity can be observed on the screen of a cathode ray oscilloscope.

The Bureau says that further modifications in this flowmeter are being considered.

Altitude Compressor

A new air compressor for pressurizing radar in military planes at altitudes up to 50,000 ft. has been introduced by Lear, Inc.

The unit is designed for positive starting and stopping at −67F. Blades and rotors are the only moving parts.

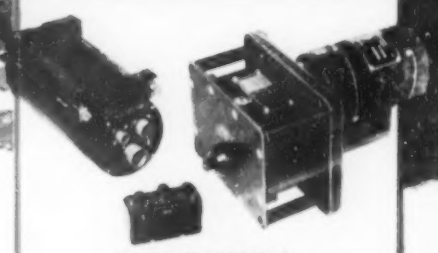
A check valve permits intermittent operation without loss of system pressure. The compressor delivers 565 cu. in./min. of air at 68F, 9 in. Hg absolute inlet pressure and 34 in. Hg outlet pressure. The assembly weighs 8.8 lb.

FOR
NORTH AMERICAN'S F-86D
SMOOTH FLIGHTS
AT SUPERSONIC SPEEDS

A nine-ton bullet hurtling through space at 10 miles per minute takes some handling. That's why the North American F-86D uses Lear controls.

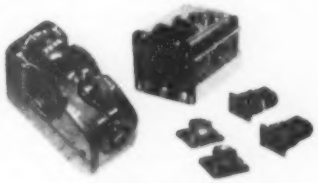
Smoothly and automatically the Lear designed F-5 Autopilot ... the lightest weight production Autopilot in use in jet fighters ... puts this fast jet plane through her paces. Lear Damping Controls augment the plane's natural stability and allow smoother flight over the plane's air-speed range. Lear Vertical Gyro Indicator Systems instantly and accurately present a true picture of the plane's attitude.

In jet fighters, bombers, transports and airliners Lear Control and Actuating Systems and Components are making flight smoother, faster, more economical —and safer.

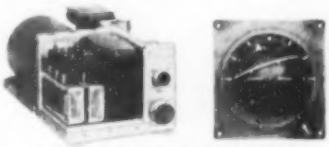


LEAR DAMPING CONTROL SYSTEM

... anticipates and measures rate of deviation from established heading and applies corrective force to control system through Lear Servo-Actuator.



AUTOMATIC PILOTS



VERTICAL GYRO SYSTEMS

OTHER INSTRUMENT PRODUCTS:

AUTOMATIC APPROACH COUPLERS AND FLIGHT CONTROLS • CONTROL MECHANISM GYROS • REMOTE READING GYRO INSTRUMENTS • RATE GYROS MISSILE FLIGHT CONTROLS

Lear

Advancing the Frontiers of Flight

GRAND RAPIDS DIVISION

110 IONIA AVE., N.W., GRAND RAPIDS 2, MICHIGAN

LEAR-ROMEC DIVISION, ELYRIA, OHIO
LEARCAL DIVISION, LOS ANGELES, CALIFORNIA
LEAR, INCORPORATED, GRAND RAPIDS 2, MICHIGAN

Silicones Help Convair B-36 Fight Cold

Ability of material to absorb punishing temperature changes finds numerous applications on big bomber.

The high-flying Convair B-36 has opened new opportunities for critical evaluation of equipment and materials in extreme cold. Use of silicones has simplified the problem of keeping the bomber's parts operative during exposure to exterior temperatures as low as —100F at high operating altitudes.

It is doubtful that the B-36 now would be as highly efficient if it had not been for the concurrent development of this engineering material, which offers stability at temperatures ranging from 500F to —100F, plus resistance to oxidation, weathering and hot oil.

Convair has worked closely with Dow Corning Corp. and several fabricators in the development of Silastic (Dow Corning's silicone) parts for low temperature applications.

► **Wide Application**—Improvements in the past few years have increased the mechanical strength of this material, while retaining its low-temperature resilience.

Data prepared by Convair's Fort Worth Division process engineer, Arthur C. Porter, indicates the extent to which silicones have been applied. He says each B-36 is equipped with Silastic gaskets and seals on almost every moving joint or closure subject to extreme high or low temperatures. Many of the instruments and subassemblies in the B-36 incorporate Silastic components. Electrical insulation of the material often plays an important part in its selection.

Although the design for the B-36 technically is frozen, improvements and changes still are being made. New applications for silicones are added whenever they prove valuable.

Unclassified silicone applications include:

• Silicones play an important part in the B-36's jet nacelle intake doors. Jet engines are used only as auxiliaries for added speed, generally over the target area. The air intakes are closed in routine flight to prevent drag. This closing is done with sectional door panels, which fold back to open. To make this folding quick and easy, the panels must be deiced. Silicone makeup is applied for this job.

Pancake heaters for the panels are made by winding resistance wire around a section of silicone-glass laminate, sandwiching it with layers of bonded Silastic, then sandwiching it again with the sheet aluminum. The Silastic not only laminates the bare resistance wire but conducts heat evenly and rapidly to the surface of the aluminum panel. The heater components are made by Connecticut Hard Rubber Co.

• Actuator for the jet pod doors is designed for immediate operation after long exposure to temperatures as low as —100F or as high as 500F. Screwjack sections of the actuator are encased in Silastic molded bellows (made by Williams-Bowman Rubber Co.) for easy operation.

• More than 500 ft. of Silastic is used to seal the bomb bay doors on every B-36. Porter reports that conventional seals, after a 20-hr. exposure to —100F, would become as hard as rocks. Even if the doors were forced open, they could not be expected to reseal when closed.

Engineering alternatives called for a substantial increase in weight and complexity. The problem was solved with a simple strip seal of Silastic. The installation is resilient after hundreds of hours at —100F, provides a tight seal, and is opened and closed with ease. It is an extrusion supplied by Stalwart, which consists of a tubular section and leg that fastens simply by snapping in place inside a metal channel.

• Silastic extrusions similar to those on the bomb bay doors are used for sealing the astrodome and camera door.

• An Orlon-wrapped Silastic seal prevents air turbulence between the flap and engine nacelle. Here, the operating temperatures range from —100F to 325F.

Formerly Convair used natural sponge rubber with a vinyl fabric cover, but high ambient temperatures caused the sulphur to migrate into the vinyl and break it down, it is claimed. Also, the rubber would melt down to a gum within 50-100 hr. of service. Fabricated by Stalwart Rubber Co., the Silastic seal lasts at least 500 hr.

• About 300 Silastic gaskets are used for flange connections in the hot air ducts of a B-36. These gaskets, made by Immel Engineering Co. of Silastic-coated glass cloth, provide a positive seal at temperatures in the range of 400F. The coated cloth also is used over hot duct joints where they show excellent resistance to compression set, eliminating the big maintenance job of tightening clamps, it is reported.

• Each B-36 nose turret incorporates two cloth-wrapped sponge Silastic seals. These Stalwart-fabricated units are 56 in. long, with a 1-in. O.D. and ½-in. I.D.

• Another sponge seal, with a jacket of doped cotton cloth, prevents air turbulence between the flap leading edge and the wing trailing edge. Made by Arrowhead Rubber Co., more than 90 ft. of this installation is required for each plane.

• More than 180 limit switches on the plane are protected with Silastic molded boots for maximum flexibility at sub-zero temperatures. These units, made by Williams-Bowman Rubber Co., prevent corrosion and untimely shorting of the switch actuating plungers.

• Rocker boxes on the plane's Pratt & Whitney Wasp Major engines are gasketed with Silastic-coated glass cloth. It is claimed this material gives longer, more economical service in direct contact with hot oil at temperatures in the range of 450F than any other combination tested.

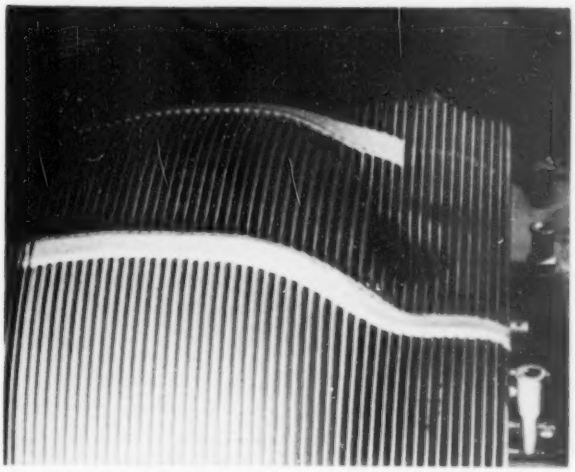
Other engine applications include insulation for ignition wires and dampers for cylinder cooling fin vibration. Previously used metal strips for damping often broke the fins; organic rubber softened at operating temperatures. Silastic strips have a relatively firm backing over a soft strip that slides in and around the fins and is cured in place by heat of the engine.

• Ice is prevented from plugging oil ventlines (with resultant back-pressure buildup that might ruin an engine) by wrapping each of 12 vents with layers of Silastic R tape and resistance wire. The tape is not affected by the heat of the elements, nor does it become brittle after long exposure to sub-zero temperatures, it is reported.

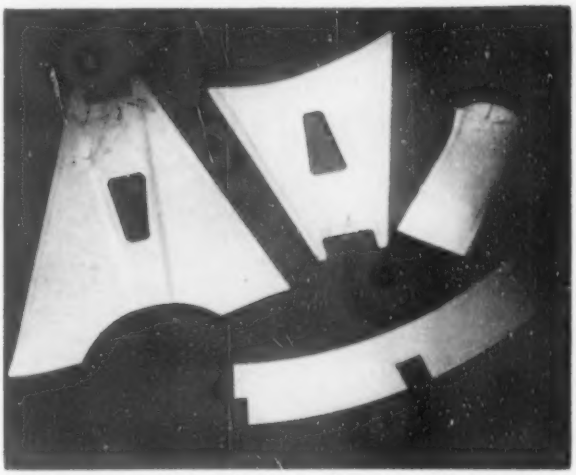
• In a heating and ventilating fan, stator and rotor are more than 1 ft. in diameter but less than 2 in. thick, with fan blades mounted inside the stator. With this makeup, which saves almost 1 ft. in depth space, protection against overloads and high ambient temperatures is by using silicone (Class H) electrical insulation throughout.

• Silicone grease has replaced zinc chromate compound wherever cadmium-plated nuts, bolts, washers and screws are used in magnesium assem-

How Convair Engineers Use Silicones on Giant B-36 . . .

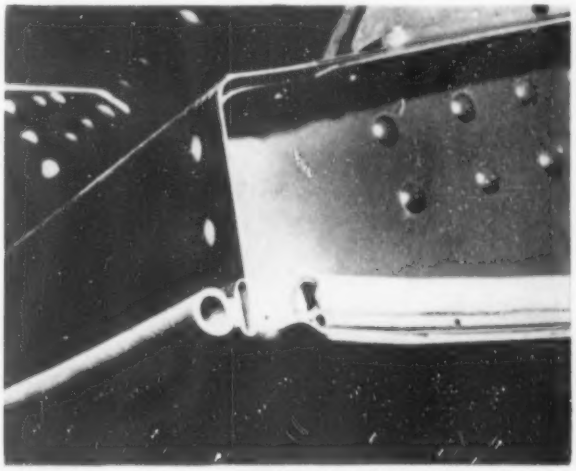


CYLINDER FINS are fitted with dual strips of Dow Corning Silastic vibration dampers.

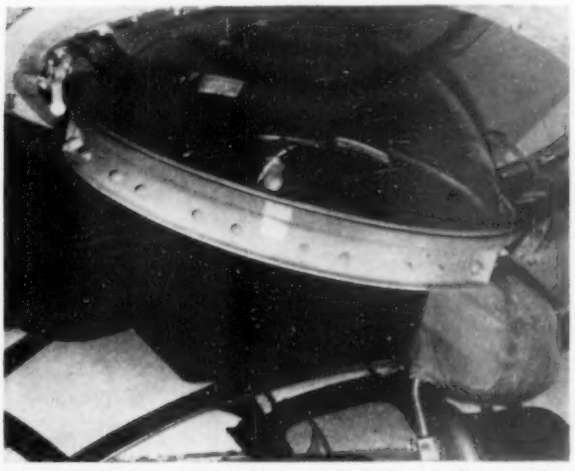


HEATERS for engine intake doors are silicone-glass laminate sandwiched in Silastic and aluminum.

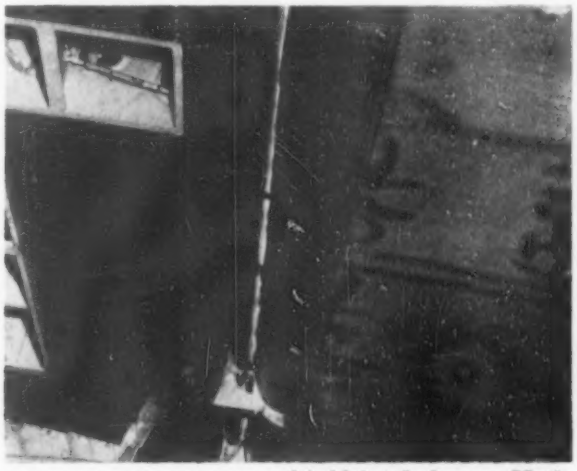
SEAL of Orlon-wrapped Silastic prevents air turbulence between flap and engine nacelle. Seal lasts at least 500 hr.



BOMB BAY DOOR seal is simply attached by snapping it inside metal channels.



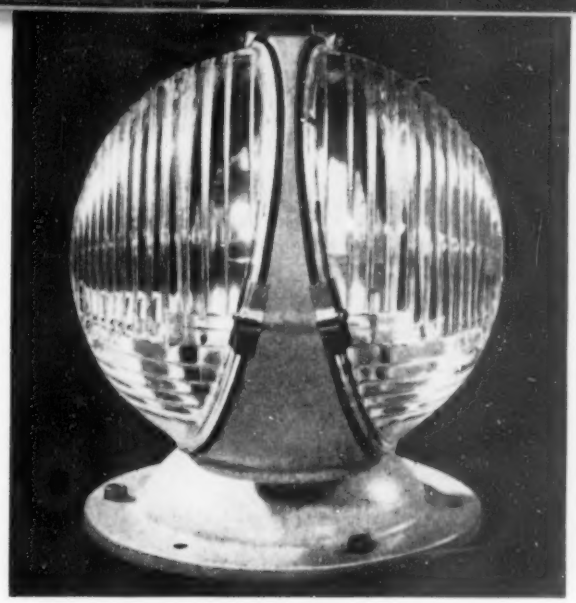
ASTRODOME seal is capable of providing positive resilient closure at −100 deg. F.



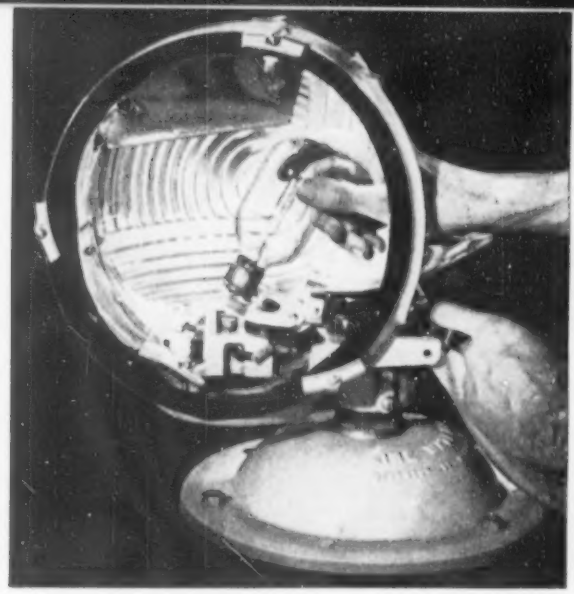
WING-TO-FLAP seal is fabricated of sponge Silastic, but has a doped cotton cloth jacket.

Single Control for Both Beam Direction and Brightness in L-M's New THERMAL BEAM

- CAA-approved under specification L-818.
- 200,000 beam candlepower—double CAA requirements.
- New simplified beam control.
- Simplified tower control of brightness and beam direction.
- Lower installation and maintenance costs.
- Low mounting height.
- Efficient operation.



If the unit should be struck by aircraft the ball-shaped design causes minimum damage. The break-off adapter shears off on impact and the round unit just rolls away. Rugged construction of the unit and the thermal elements insures long life.



Large door swings down, for easy accessibility. Door and lens mountings are completely dust and water tight. Since most of the operating hours are at well below maximum lamp rating, lamps give long life, require replacing only at long intervals.

Here's L-M's New High Intensity Controllable Beam Runway Light

New THERMAL BEAM high intensity runway light has 200,000 beam candlepower. Provides single current control for both brightness and beam direction. Elimination of extra circuits and auxiliaries simplifies operation and reduces installation and maintenance costs.

By **R. E. MADIGAN**
Manager
Airport Lighting Sales
Line Material Company

Many years of development and testing by L-M's lighting engineering staff have resulted in a new and greatly improved high intensity runway light meeting CAA specification L-818.

The new unit, known as the L-M THERMAL BEAM, is ingeniously simple. Its design is based on the principle that weather requiring maximum brightness also requires maximum "coning-in" of the beams.

Single Control for Beam and Brightness

In the THERMAL BEAM, both are controlled by a single current variation. This provides simplified automatic control of beam direction by the tower.

Current variations operate directly upon the lamp filament. They also act upon a coiled bi-metal strip which is geared to move the lamp back and forth.

When the current is raised, brightness increases, and the bi-metal strip moves the lamp parallel with the lens and reflector, so that the beam moves inward. Thus pairs of beams from units at opposite sides of the runway meet at a point much closer than in clear weather, when lamp intensity is reduced and beams are "coned" *out* to meet at a farther point.

Temperature-Compensated

A second bi-metal spiral compensates for outside temperatures, so that the beam direction remains constant at any given brightness, regardless of warm or cold weather.

Optical Assembly

The optical elements are specially designed to produce a balanced photometric distribution, meeting all practical operating requirements for landing of aircraft under varying weather conditions.

Reduces Installation Costs

THERMAL BEAM gives lower material and installation costs through the elimination of beam control circuits and auxiliary control equipment. By making use of the current variations employed in regulating lamp brightness, all auxiliary field wiring is eliminated, giving improved reliability.

Write for Bulletin

This bulletin gives more information, details on installation methods, specifications of the units. If you wish, we'll have an L-M Field Engineer call on you. Write to Mr. Madigan at Line Material Company, Airport Lighting Division, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LINE MATERIAL CO. AW-33
MILWAUKEE 1, WISCONSIN

☐ Please send me, without obligation, THERMAL BEAM Bulletin.
☐ Please have a Field Engineer call.

Name _____

Company or Airport _____

Address _____

City _____ *State* _____

LINE MATERIAL
Airport Lighting

"THERMAL BEAM" is a Line Material Company trademark

blies. The silicone coating does not seize at −65F and prevents electrolytic corrosion.

• Silastic blankets have shown economy in production of Convair's Metlbond process, where layers of sheet are laminated under heat and vacuum. Organic rubber blankets provide approximately 30 cures in the Metlbond machine, while Silastic replacements last for more than 400.

Wing Protector

Plastic insect screening is being used by Lockheed Aircraft Corp.'s plant at Marietta, Ga., to protect aluminum wings of B-47 jet bombers from scratches.

A layer of Lumite Saran screening, manufactured by Chicopee Lumite Division at Cornelia, Ga., is laid in a coating of vinyl plastic painted on the upper surface of the B-47 wings. This forms a walkway for workmen to use while installing parts in the 116-ft. wings.

The new Lumite covering replaces paper and felt coverings which, in the main, had not prevented scratches on the wings. Paper tore easily, and felt was hard to keep in place, collected metal shavings and chips from drilling operations, was heavy and hard to clean for re-use.

The new plastic screening cover costs less, and is easy to apply and strip. It is translucent, so all identification marks can be seen. Screening cost for one wing, including labor, is $36.20, as against $52.70 for felt. The plastic screen can be used 10 times, as against twice for felt.

Grumman F10F Plant Readied

A new 4,500-acre facility for assembly and flight tests of the radical F10F Jaguar and other revolutionary Navy fighters is being speeded to completion by Grumman Aircraft Engineering Corp. at Peconic River near Calverton on eastern Long Island, N. Y. The plant, being built out of Navy funds, is scheduled to begin operation by early fall of this year.

Some measure of the size of the new plant can be gathered from the dimensions of its two runways, which will be located at right angles to each other. One will be more than 10,000 ft. long, the other will exceed 7,000 ft. in length.

Buildings will utilize precast insulated concrete panels in combination with insulated fluted aluminum panel siding to provide maximum soundproofing. Initial working force will comprise approximately 900 employes. Grumman's Bethpage, L. I., plant will continue to handle current production schedules.

Assembly and testing of the swept-wing F9F-6 Cougar, Panther successor, will be handled at Peconic River. The Grumman XF10F-1 Jaguar prototype has been undergoing an intensive flight test program at Edwards AFB, Calif., since early last spring.

PRODUCTION BRIEFING

▶ **Hiller Helicopter Co.,** Palo Alto, Calif., is building a 15,900-sq. ft. engineering test structure to permit separation of flight-line work from the production building.

▶ **Glenn L. Martin Co.,** Baltimore, has ordered a 6,500-ton-capacity Marform press from Hydropress, Inc., N. Y.

▶ **Temco Aircraft Corp.,** Dallas, has received Navy Bureau of Yards and Docks approval for construction of three building units as part of the firm's production program on the McDonnell F3H Demon and other aircraft. Total cost of the buildings is expected to be approximately $2.2 million.

▶ **Aero Design & Engineering Co.,** Oklahoma City, has named new distributors for its Commander twin-engine executive plane: Harte Flying Service, Inc., Hutchinson, Kan., and the Babb Co. (Canada) Ltd., Montreal Airport, Dorval, Province of Quebec.

▶ **Air Conditioning Division** of Remington Corp., Auburn, N. Y., has appointed Rears & Simpkins, Dayton, Ohio, to handle sales of Remington air conditioning equipment for aircraft maintenance such as the Remington 36T trailer-mounted mobile cooler unit.

▶ **American Research Corp.,** Bristol, Conn., has started design and production of environmental test equipment, including walk-in test cabinets and ultra-cold-treating equipment.

▶ **M. W. Kellogg Co.,** a Pullman, Inc., subsidiary, has established warehouse facilities in Vernon, Calif., for Kel-F plastic molding powders.

BENDIX-PACIFIC HELPS AMERICA FIGHT

BENEATH THE SEAS...

In addition to its extensive electronics developments in radar, radio control, telemetering and missile guidance, Bendix-Pacific is a major source for highly restricted airborne and underwater sonar.

Can we help you with the practical solution to **your** specialized electronic problem? Your inquiry is invited.

Bendix
Pacific Division
Bendix Aviation Corporation
NORTH HOLLYWOOD, CALIF.

ATTENTION ENGINEERS...

Bendix-Pacific has a few openings for thoroughly qualified engineers in sonar, radar, servomechanisms and telemetering. For those seeking a challenging future under ideal Southern California living conditions, Bendix-Pacific offers worthwhile opportunity. Your inquiry will be considered in strict confidence.

Supermarine Swift

The Supermarine Swift (Rolls-Royce Avon with reheat) will be the first swept-wing fighter in squadron service with the Royal Air Force

VICKERS - ARMSTRONGS LTD · SUPERMARINE WORKS · ENGLAND

Navy Contracts

The following contracts were announced recently by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11.

Felsenthal & Sons, Inc., computer, 10,010 ea., $44,344.

Sperry Gyroscope Co., div. of the Sperry Corp., Great Neck, N. Y., drive and motor assembly, 62 ea., $61,194.

Waukesha Motor Co., Waukesha, Wis., auxiliary power plant, 362 ea., $504,860.

Weston Electrical Inst., 101 North 33rd St., Philadelphia, thermometer bulb, 26,509 ea., $111,073.

United Aircraft Corp., Chance Vought Aircraft Div., P. O. Box 5907, Dallas, parts for F4U aircraft, $63,962.

United Aircraft Corp., Pratt & Whitney Div., East Hartford 8, Conn., spare parts for J57-P9 engines, $1,961,080, $3,552,452; items for R4360 P&W engines, $89,151; liners, $43,047; gasket, bolt, bracket assemblies, $3,896,749; deflector assemblies, $50,193; keys, linkpin assembly, $40,102.

Lewis Engr. Co., 339 Church St., Naugatuck, Conn., indicator, thermometer, (oil), $75,900; indicator, thermometer, $149,927.

United States Gauge Div. of American Machine & Metals Inc., Clymer Ave., Sellersville, Pa., transmitter, 274 ea., $90,850.

Du Pont de Nemours, E. I., Photo Products Dept., Wilmington 98, Del., photographic paper, $42,939.

Owens-Corning Fiberglas Corp., Nicholas Bldg., Toledo, glass fibers, 217,700 lb., $245,783.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., indicator, 274 ea., $48,959.

Westinghouse Electric, Aviation Gas Turbine Div., Lester Branch Post Office, Philadelphia 13, maintenance parts for use on J40-WE22, $335,303.

Douglas Aircraft Co., El Segundo, Calif., maintenance parts for AD aircraft, $64,449.

USAF Contracts

Following is a list of recent USAF contracts announced by the Air Materiel Command.

Allied Aircraft Co., 5536 Satsuma Ave., North Hollywood, Calif., hydrogen generators, 7,000 ea., $53,340.

Calvin Co., 1105 Truman Rd., Kansas City, Mo., reproduction of color film, $65,000.

Capehart-Farnsworth Corp., 3700 E. Pontiac St., Ft. Wayne, Ind., receiving set, 135 ea., $250,000.

Chandler-Evans Div., Niles-Bement-Pond Co., 1 Charter Oak Blvd., West Hartford 1, Conn., vane assembly, 20,000 ea., $26,600.

Chevrolet Motor Div., General Motors Corp., Detroit 2, cab assembly, 1466 ea., $388,665.

Consolidated Vultee Aircraft Corp., San Diego, for repairs & services of GFP, $75,000.

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J., spares for B-29, $403,392, indicator, pressure, torque, 1,904 ea., 101 ea., 869 ea., $148,401.

General Electric Co., 1 River Rd., Schenectady, N. Y., indicator, tachometer, 1,670 ea., $162,365; indicator, position, flaps, 1,512 ea., $65,611.

Gordon Instruments, 6009 W. Pico Blvd., Los Angeles 35, slotted radial templet, spare parts, maintenance data, 200 ea., $147,453.

Scintilla Magneto Div., Bendix Aviation Corp., Sidney, parts, magneto, $531,982.

Sylvania Electric Products, Inc., 254 Rano St., Buffalo, 7, radio receiver, 2,068 ea., radio transmitter, 2,796 ea., power junction box, 2,555 ea., $3,468,905.

U. S. Gauge Div., American Mach. & Metals Inc., Sellersville, Pa., transmitter, fuel pressure, 1,878 ea., $206,525.

Williams, Brown & Earle, Inc., 918 Chestnut St., Philadelphia, contact printer, 47 ea., timer, automatic interval, 195 ea., tank, developing, 125 ea., $43,558.

AVIATION SAFETY

CAB Report on PAA Door Blowout Near Rio

Board Stresses Door-Closing Care

The need for proper evaluation and action on warning indications of improperly locked doors in pressurized aircraft is emphasized in the Civil Aeronautics Board official report on the door blowout that occurred in a PAA Stratocruiser off Brazil last July. A woman passenger was blown out in the accident. A loose door frame seal had prevented the door from locking. CAB's report:

THE ACCIDENT

The main cabin door of Pan American World Airways' Boeing 377, N 1030V, opened suddenly during pressurized flight at about 1446 GMT,[1] July 27, 1952. Outrushing air blew overboard a woman passenger who had been in seat No. 33, closest to the door. The aircraft was at an altitude of about 12,000 feet and was pressurized to a differential of 4.1 pounds per square inch. At the time the aircraft was over ocean outbound about 18 minutes from Rio de Janeiro, Brazil, at about Latitude 23° 30′ S and Longitude 43° 40′ W.

HISTORY OF THE FLIGHT

This fight, designated by PAWA as Flight No. 201 of July 26, 1952, originated at New York International Airport (Idlewild). Its destination was Buenos Aires, Argentina, South America, with stops scheduled at Port of Spain, Trinidad, B.W.I.; Rio de Janeiro, Brazil; and Montevideo, Uruguay.

Crew changes on Flight No. 201 were made at Port of Spain and Rio de Janeiro.

From Idlewild to Port of Spain the flight was routine, with no reported difficulty in the functioning of the main cabin door except for the purser's later statement, "I found the door handle to be quite difficult to open or close."

The same type of routine operation was experienced on the second leg of the flight, from Port of Spain to Rio de Janeiro, again with no reported difficulty in the functioning of the main cabin door except that the purser on this leg later stated, "The only thing noticed was a slight difficulty in locking the door which is not uncommon on the B-377." Neither purser, however, considered the door handle difficulty of sufficient importance to report. The aircraft landed uneventfully at Rio de Janeiro and was serviced and loaded for the next portion of the flight.

The crew from Rio de Janeiro consisted of Captain G. L. Fly, First Officer R. A. Sylvester, Flight Engineer J. D. Knight, Radio Officer C. E. Donaldson, Purser G. A. Oliva, Stewardess L. Hill, and Stewards R. Garcia and M. A. Dominguez. There were 19 passengers. The aircraft was so loaded that its center of gravity was within prescribed limits, and its total weight was 56,660 kilos (124,935 lb.) as compared with its maximum allowable take-off weight of 60,191 kilos (132,721 lb.). The flight plan was according to instrument flight rules at an altitude of 6,000 meters, or approximately 20,000 feet.

After the aircraft was loaded, the main cabin door was closed and supposedly locked by ground personnel and the position of the inside handle checked by the purser, as was routine practice. During the cockpit check, prior to starting the engines, a cockpit warning light remained on indicating that one or more of the cabin doors (two cargo, one galley and the main cabin) was not locked. Accordingly, the flight engineer inspected the two cargo doors and the main cabin door. (The galley door was inspected by ground personnel and pronounced locked, via interphone.) The flight engineer noticed that the handle of the main cabin door was not in the horizontal (locked) position. He opened the door, closed it, and turned the handle as far as it would go toward the horizontal (locked) position. He estimated that the handle was within about 25° of the locked position. The flight engineer testified that he used a flashlight to check the positions of the four bolt mechanisms and the pressure lock visible through their respective inspection windows on the inside of the door. All seemed normal. He then reported to the captain that all doors were locked. The engines were started, and the aircraft left the ramp and took off at 1428. During this time the door warning light remained on.

A climb was started, as was cabin pressurization. At an altitude of about 12,000 feet and with a cabin pressure differential of 4.1 psi., corresponding to a cabin altitude of about 2,000 feet, the purser heard a loud hissing noise at the cabin door. He went to the flight deck and stated to the captain, "We should depressurize because I think the door is open."

The captain ordered the flight engineer to inspect the door. (The door warning light was still on.) The first officer assumed the station of flight engineer who went aft with the purser. Both inspected the door while the captain stopped the aircraft's climb. The flight engineer did not make a visual inspection through the door windows but placed his hand along the top edge of the door, whereupon the noise decreased. He then instructed the purser to place wet towels in the area to reduce the air leak and the noise. At this time the door handle was still not in the locked position, the flight engineer estimating that it was still about 25° from being in the horizontal position and the purser estimating it to be only about 19° from the vertical, or fully unlocked position.

The purser then went aft in the cabin

[1] Greenwich Mean Time. Rio de Janeiro time was 1146.

THE BIG

NEWS!

IN AVIATION PRODUCTION

is what

LAPOINTE BROACHING

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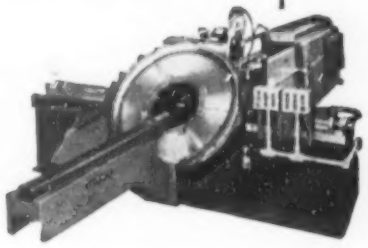

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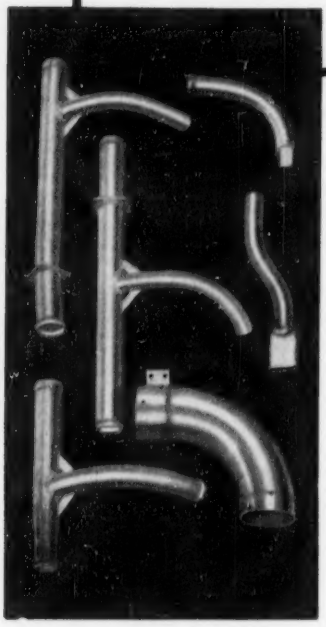

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to procure towels. The flight engineer returned to his station and reported to the captain that the door seal was leaking but everything seemed normal. The captain elected to continue. The door warning light was still on.

Within a minute or two, at 1446, the cabin door blew open. As stated, a woman passenger in seat No. 33, nearest the door, went through it. None of the other occupants was injured although many of them experienced a temporary ear discomfort as would occur following a rapid depressurization. The depressurization, of an explosive violence, caused damage throughout the cabin, blowing loose ceiling panels and many sections of soundproofing and upholstery and tearing off the door of the ladies' lavatory. Fog, caused by condensation at the lower pressure, temporarily filled the cabin.

The aircraft was immediately turned back to Rio de Janeiro where it landed uneventfully at 1513, forty-five minutes after taking off. During the entire flight the weather was good, with little or no turbulence. The door opened while the aircraft was on course for Montevideo and about seven minutes after passing abeam of Santa Cruz.

Upon notification of this accident, the Brazilian Government immediately instituted an intensive air, sea and shore search for the body of the missing passenger. This search was futile.

INVESTIGATION

When the flight returned to Rio de Janeiro, local authorities immediately placed the aircraft under guard. Passengers were deplaned, questioned and permitted to leave on a subsequent flight.

An accident investigator of the Civil Aeronautics Board, at that time on temporary duty at Rio de Janeiro, took part in the investigation at the invitation of the Director of Civil Aviation for Brazil.

As the main cabin door, its locking mechanism and the manner of its opening will be discussed at some length, it is appropriate here to describe that door and its associated safety devices.

The door opens outward and is hung on two hinges at its forward edge. It has both an external and an internal locking handle. The external handle is approximately nine inches long and is mounted at its center on the locking shaft. The internal handle is a lever about nine inches long mounted at one end on the same locking shaft. Normally, these two handles remain parallel. The door is completely unlocked when the handles are approximately vertical with the internal handle upward. It is fully locked when the handles are approximately horizontal, i.e., when the internal handle is turned counter-clockwise to a horizontal position.

The outside of the door is marked with two curved arrows showing the directions to turn the door handle, "to unlock" and "to lock." The inside of the door has a single arrow curved clockwise, marked "turn handle—opens out."

Rotation of the door handle shaft actuates a mechanism that extends or retracts 13 locking bolts, commonly called bayonets, placed around the edge of the door. There

are two of these bolts on both the top and the bottom of the door edge, five on the forward edge and four on the aft edge. These bolts are extremely hard and are polished. Their full travel from the unlock to the lock position is approximately 1¼ inches. The outer approximate halves of all 13 bolts are tapered in both width and thickness.

Around the door frame are 13 receptacles which receive the bolts. Each is capped with a striker plate with an orifice into which the fully extended bolt fits snugly.

The inside of the door is fitted with five clear plastic windows. One, located on the lower rear, allows visual inspection of the door's pressure lock. The other four, two at the top and two at the bottom of the door, allow visual inspection of the positions of the mechanism actuating the four bolts (bayonets) located immediately adjacent to the bases of the bolts.

The Pan American B-377 operations manual, carried aboard the aircraft, describes completely the locking mechanisms of the various exterior doors of the aircraft and their safety devices.[2] A description of the main entrance door locking mechanism is quoted as follows:

1. PRESSURE LOCK: To prevent anyone from inadvertently opening the door when the cabin is pressurized, the pressure lock acts to prevent movement of the lower cable system. The lock is energized continuously when cabin pressure differentials exceed 2" H.O. Engagement of the pressure lock may be checked through the square window on the lower aft portion of the door.

2. LATCH DOG LOCK: This lock prevents damage to 13 latch dogs by locking all dogs in the retracted position when the door is opened and thus prevents slamming door closed on the open latch dogs. This lock is automatically operated by a small striker plate in the upper forward portion of the door.

3. VIBRATION LOCK: To prevent the door latching dogs from working loose due to vibration, the vibration lock automatically engages a locking pin in the door handle sprocket when the door handle is turned into the locked position. During the first 30 degrees of unlatching, the rotation of the door handle acts to disengage the vibration lock pin from the door handle sprocket.

4. ANTI-ROTATION LATCH: A spring catch type anti-rotation latch installed under the lining of the door handle shaft. It serves to prevent rotation of handle toward the unlocked position due to vibration, serving the same purpose as the vibration lock.

5. BUNGEE CORD: In event of failure of the vibration lock the bungee cord applies sufficient tension to the door handle to maintain it in the locked position and thus prevent the locking mechanism from working loose due to vibration.

[2] PAA B-377 operations manual, aircraft description of exterior doors, item 87.011 (1) and (2), published Aug. 14, 1951.

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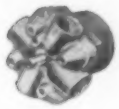

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HANDLE POSITION . . . Handle should be horizontal, and against internal stop. If handle is not horizontal when it is against stop, write up for Maintenance action.

BUNGEE CORD . . . Cord should be attached from rear end of handle to the lower portion of the door.

PRESSURE LOCK . . . When pressure differential exceeds 2" H.O, dogs should be in position to prevent cable from being moved sufficiently to actuate door latches. The lacking dogs are viewed through square window in aft lower portion of door.

DOOR LATCHES . . . Door latches may be viewed through the four circular windows, two at the top and two at the bottom of the door. Latch mechanisms should be in locked position.

WARNING

1. *In event of main entrance door air leakage, the area in front of the door should not be used for food service cleaning purposes.*
2. *In event of main entrance door air leakage, do not touch the door handle. Any attempt to adjust handle during pressurized flight can only lead to further opening of the door.*

There is installed in the B-377 aircraft a door warning system. It is designed to alert the crew to any malfunction of the main entrance cabin door, forward cargo door, rear cargo door and the galley loading door by means of a warning light in the cockpit. At the chaincabin door there are two door-closed microswitches installed in the door frame, one for the upper cable system and the other for the lower cable system, and one door-locked warning switch under the door lining, actuated by the vibration lock. These microswitches are installed to cover not only the complete traveling action of the locking door bayonets, or bolts, but also to cover the complete rotation of the door handle to insure that the vibration latch and the anti-rotation latch are completely secure. These switches are so located that they can be readily inspected at all times.

The B-377 operations manual "Aircraft Description Exterior Doors" also includes instructions when the door warning light comes on in the cockpit. These instructions, in part, are as follows:

If the warning light remains illuminated after all doors are closed and locked, the following should be checked O.K. prior to takeoff:

Main entrance door.

1. *Four latches fully closed (check thru 4 windows).*
2. *Door handle in locked position.*
3. *Bungee cord attached.*

Examination of the cabin main entrance door was made at Rio de Janeiro. Damage to the door was confined to downward distortion of both hinges, a cracked lower hinge and three rivets missing from the lower hinge. The forward edge of the

aluminum metal window frame in the door was distorted rearward, and a small section of upholstering fabric at the center rear edge was missing. A deep indentation and slight displacement of the rubber door seal near the door's upper rear corner was found and there was a small indentation of the rubber seal near the door's lower rear corner.

Damage to the door frame was confined to a slight depression of the frame metal near the upper rear corner. The rubber seal across the top of the frame was missing. The remainder of the frame's rubber seal appeared to be somewhat deteriorated.

The mating indentations in the door and its frame were of such size and nature that they were obviously caused by the loosened and wedged door frame seal.

No evidence of failure or malfunctioning of the main entrance door locking mechanism was found. All rigging adjustments that could be checked were found to be within acceptable tolerance. This included the microswitch actuator adjustments, the bayonet extensions, and all other checks except the cable tension check, the pressure switch pressure check and the anti-vibration lock plunger clearance check.

The pressure switch secondary lock was actuated by connecting a rubber tube to it and blowing through the tube. This properly locked the mechanism and made it possible to measure the clearance which was within the tolerance specified by the CAA approved company maintenance manual.

No tensiometer was available with which to measure the bayonet lock actuating cable tension. The upper cable appeared to be adjusted approximately to the required tension of 30 to 40 pounds but the lower cable appeared to retain only about half of that tension. There appeared to be some abnormal play in the actuating mechanism during operation of the handle but it did not affect the proper locking of the door during tests.

It was not possible to close the main entrance door until the hinges were disconnected. When this was done the door was closed, the aircraft's electrical power system was actuated and the door was locked. During this test the door warning light actuated properly and the door handle moved fully to its horizontal, locked position. The door was then unlocked and the flight engineer involved, while standing in the cabin moved the locking handle as far to the left as he remembered moving it just prior to the flight involved.

This position was at a point midway between the unlocked and locked positions which was at an angle of about 45° rearward from vertical. The flight engineer then continued the leftward movement of the handle until it was fully in the horizontal position. During this latter test, the door moved noticeably inboard, as is normal.

All 13 bayonet wells in the door frame lock plates were examined for foreign matter. A small amount of sediment was found in each of the two lower wells and in the aft lower well, a small clothing type safety pin and the head of a small dural rivet were also found. No evidence of distortion or fresh scoring was found on either of these objects. The wells measured 1½ inches deep and the bayonet extension of the aft lower bayonet measured 1 7/16 inches.

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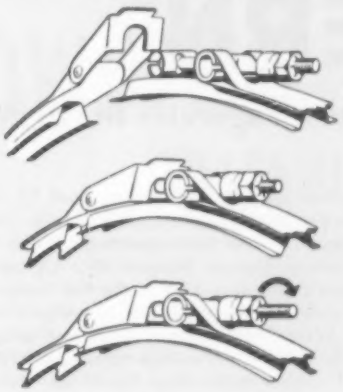

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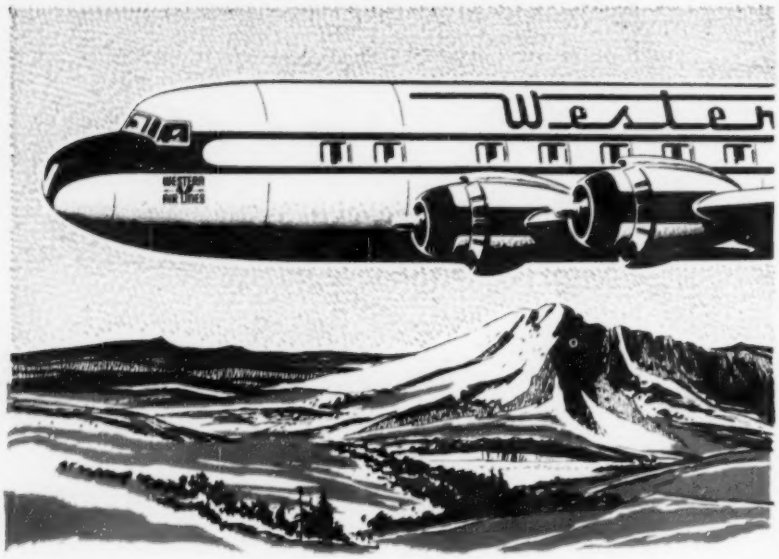

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the allowable extension being 1⅞ to 1½ inches.

The reclining back of seat No. 33, located adjacent to the left cabin wall just forward of the main entrance door (occupied by the missing passenger) was found collapsed rearward with its lower structure broken, the headrest missing and the upholstery at the upper outboard corner torn. The seat belt was intact and unbuckled. The inboard arm rests of three aisle seats (Nos. 10, 15 and 25) located along the aisle between the lavatory and the main entrance door were also damaged.

No repairs were made to N 1030V at Rio de Janeiro, and the aircraft was ferried to Miami on July 31, 1952, where it was met by a Board investigator. Security was established over the aircraft and its log books and the investigation was continued on that date. Physical findings of the preceding investigation were confirmed at Miami. Examination of the main cabin door and door frame revealed some minor distortions and a somewhat deteriorated door frame sponge rubber seal. (On July 1, 1952, 26 days before the accident, a new seal had been installed in the door frame.) The lower door hinge which was distorted had been removed at Rio de Janeiro so that the door could be closed for the ferry flight.

This door was opened, closed and locked numerous times to determine if the locking mechanism or any of its safety devices were malfunctioning. None was found. The door warning light system was also checked several times; no evidence of malfunctioning was found.

After repair of the door hinge and sealing arrangement and the proper adjusting of the tension of the lower cable at Miami, the door was re-installed in N 1030V. Flight tests were then conducted which disclosed air leakage around the door. Recheck of the sealing arrangement revealed that air was leaking between two sheet metal members, part of the door frame. This admitted air to the space behind the door frame seal. Air leaking into this space would tend to loosen the bond which holds the door frame seal. It was determined that the metal screws holding the door frame trim angle were loose, and tightening them stopped the leak.

Board investigators reviewed all maintenance records applicable to the main cabin door of N 1030V for a 30-day period prior to the accident. These records disclosed three instances of door leakage due to deterioration of the rubber seal. In addition, the company submitted to the Board a B-377 door warning summary of instances of trouble and corrective action taken on all of its Boeings for the six-months period. During this period there were 28 reported instances of trouble invoving the aircraft's four exterior doors, including faulty door frame seals and leakage around the main cabin door. A majority of these instances, however, indicated trouble in the door warning light system. There have been many instances of false warnings to the crew in the cockpit, but in each case when the light came on, it was the duty of the flight engineer to check the locking mechanisms of the exterior doors. Because of these rather frequent false warnings, it became

practice to ignore the warning light, after a check had been made.

The flight engineer testified that he had received three weeks training on the B-377 at the Boeing factory during February 1949. This course included a brief familiarization with the general locking mechanism of the aircraft's exterior doors. Later he was given the usual flight training course of about 50 hours. One of his overall duties was checking these doors if the door warning light came on in the cockpit. The flight engineer had approximately 2,607 hours on the B-377.

The captain testified that he attended the company's school for B-377 familiarization at New York for approximately six weeks in 1950. The course included discussion and inspection of the doors, their locking mechanism and their warning devices.

ANALYSIS

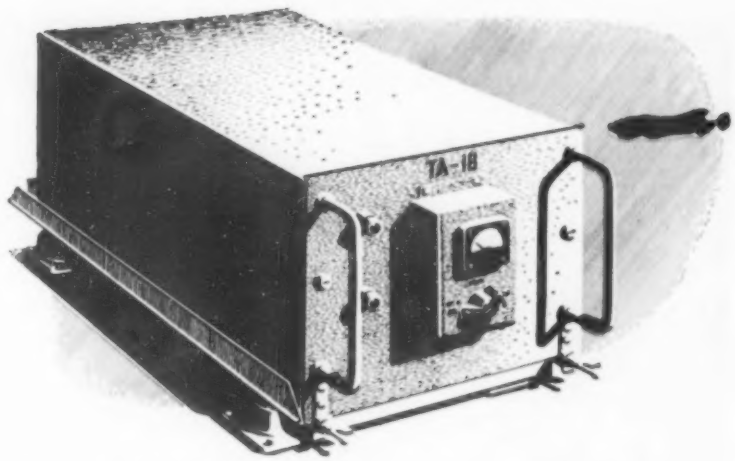
As explained, there was no malfunctioning of the door or any of its locking mechanisms or safety devices, and it is thus clear that the accident was caused by the crew's failure to recognize the hazard of an incompletely locked cabin door, due to jamming by a loosened door frame seal. None of the previously mentioned safety locking devices can function unless the latching mechanism and the door handle are in the fully closed position.

The crew should have been aware of the danger because of three fully independent warnings of imminent trouble. First was the warning light that remained on. Second was the noise of pressurized air escaping around the top of the door. And third, and possibly the most important, was the fact that the door handle never was in a position to more than partially extend the locking bolts (bayonets).

The first of these three warnings, the light, was plain and continuous. The second, the escaping air, was brought to the flight crew's attention by the purser. The third, the door handle's position, should in itself have been enough to indicate to the flight engineer what was due to happen. In fact, the flight engineer's act of attempting to force further the door handle during pressurized flight could well have precipitated the blow-out. The company's operating manual plainly states that in the event of door leakage the door handle shall not be touched because any attempt to adjust it during pressurized flight can only lead to further opening of the door. The flight engineer was aware of this specification but ignored it. Furthermore, when he first checked the door handle on the ground and found, after opening and reclosing the door, that the handle would still not go to its locked (horizontal) position, he could readily have learned whether the locking mechanism was working properly by reopening the door and turning the door handle to the closed position while observing the travel of the locking bolts. This he did not do.

The flight practice of ignoring a door warning light, despite frequent false warnings, is certainly subject to criticism. In this case the warning light was a true warning.

The deep indentation in the door's upper



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rear corner and slight displacement of the adjacent portion of the door's seal mated exactly with the slight depression in the door frame. In other words, when the door was closed, the two depressions abutted as if they had both been caused by the wedging of the same object.

The positions of these two depressions relative to the missing portion of the door seal suggested strongly that it was a loosened and sagging door frame seal that had jammed at that point.

Accordingly, tests were conducted with a similar obstruction placed in the same position. It was found that under this condition, the door handle could be rotated only to approximately the same position from the horizontal as was described by the flight engineer.

Both pursers on the two previous legs of this flight testified as to difficulty in fully closing the door. This might well, and probably does, mean that the door frame seal was becoming loose several flight hours before the accident but not, of course, to the extent necessary to prevent full locking of the door.

As previously described, N 1030V was test flown after all repairs had been made to the cabin door and its frame. Leakage still occurred and it was found that this was caused by the loose metal screws behind the door frame lining. This condition caused the eventual loosening of the door frame seal. These loose screws had not been discovered during the door and frame repairs and probably had been loose for an appreciable period of time.

Thus, because the condition that allowed this leakage had been progressive, it is highly probable that the seal sagged from the frame after the aircraft's door was opened following the landing at Rio de Janeiro. No company employe reported a sagging seal, but its position, from the extreme top of the door frame, could allow a slight sag to remain unnoticed.

The most probable reason for the door opening during flight is as follows: The door frame seal became loosened along the top of the frame during the flight from Port of Spain to Rio de Janeiro. But, as the door remained closed, it was held in its proper position. It sagged when the door was opened, and this sagging remained unnoticed while the aircraft was made ready for the next leg of the flight. Upon closing the door the sagging seal jammed, creating the marks mentioned above and preventing the door from being fully closed. Although there is a marked difference of opinion between the flight engineer and purser as to how far the door handle was turned, it is self evident that it was turned only far enough to engage the tapered ends of the bolts in their receptacles. Cabin pressure exerted an increasing force on the door. This force reached a magnitude sufficient, under normal vibration conditions in flight, to expel the tapered ends of the bolts from their receptacles and back into the door edge, whereupon the door opened violently under the impetus of a force of several tons. Outgoing air carried away the sagging portion of the frame seal.

As one result of this accident, the carrier is installing indicators on the B-377 four latching mechanisms that are now visible

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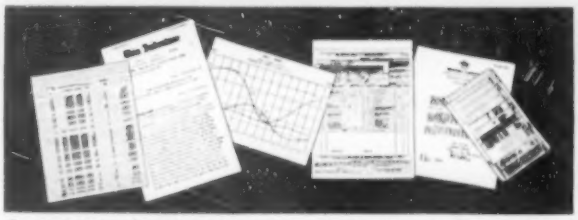

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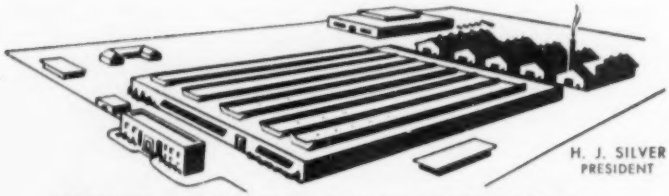

H. J. SILVER
PRESIDENT

INTERCONTINENTAL
MANUFACTURING COMPANY, INC.
GARLAND, TEXAS

through the corner windows of the cabin door. These indicators, extending to the windows, will be conspicuously colored—red for open, green for locked. Pending this installation the latching mechanisms themselves have been painted conspicuously to allow their positions to be more readily determined. The moving cap portion of the pressure switch has been marked for alignment. These marks are visible through the pressure switch window.

Also, the carrier is in the process of changing the warning light system on its B-377s. This change will involve placing a warning light at each of the four exterior doors. The single cockpit warning light will remain to indicate that any of the four doors are improperly locked, and the individual door lights will allow immediate isolation of the trouble.

All of the carrier's B-377s were immediately inspected for loose door frame trim screws and the condition of door frame seals, and this inspection will be continuous as directed by a service bulletin issued by the company to all its stations.[*]

A few days after this accident the company, following conferences with the Civil Aeronautics Administration, issued all personnel concerned a directive to follow all procedures published and in effect at the time of the accident, applicable to the main cabin door of the B-377. These included:

1. *No take-off permitted if door warning light is on unless cause of warning is definitely established as warning system malfunction.*
2. *No take-off permitted unless bayonet locks are observed to be in fully extended position and door handle is in full locked position.*
3. *Main door secure inspection to be made before take-off and again after pressurized by pilot or engineer personnel properly safeguarded to determine that door handle bayonets and pressure locks are properly engaged.*

The same directive carried these additional items which were not in effect at the time of the accident:

4. *If door warning comes on or air leak is noted at main entrance door in pressurized flight, the following action is required:*
   (a) *Move passengers from two left-hand seats just forward of main entrance door and have one flight crew member guard area at all times at safe distance and conduct any desirable investigation with proper safeguards from safe distance.*
   (b) *If door handle or bayonets not in place, as soon as conditions permit descend to safe altitude, depressurize, and properly engage door locks. Pressurized flight may be resumed if lock can be engaged.*
5. *Use guard rope in main door area at all times.*
6. *Thorough maintenance investigation any flight item on main door warning system at next station to insure maximum dependability of warning system; also strict*

[*] All other U. S. operators of B-377 equipment were likewise alerted.

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Pressure operated reducer-relief valves in which the controlled pressure is the function of a pressure in another system.

Modern hydraulic systems are becoming increasingly dependent upon the elimination of pressure surges and pump pressure variations. Accurate control of pressure in sub-systems over wide temperature and flow ranges is available with Bendix-Pacific Pressure Reducers. The types illustrated above are in volume production.

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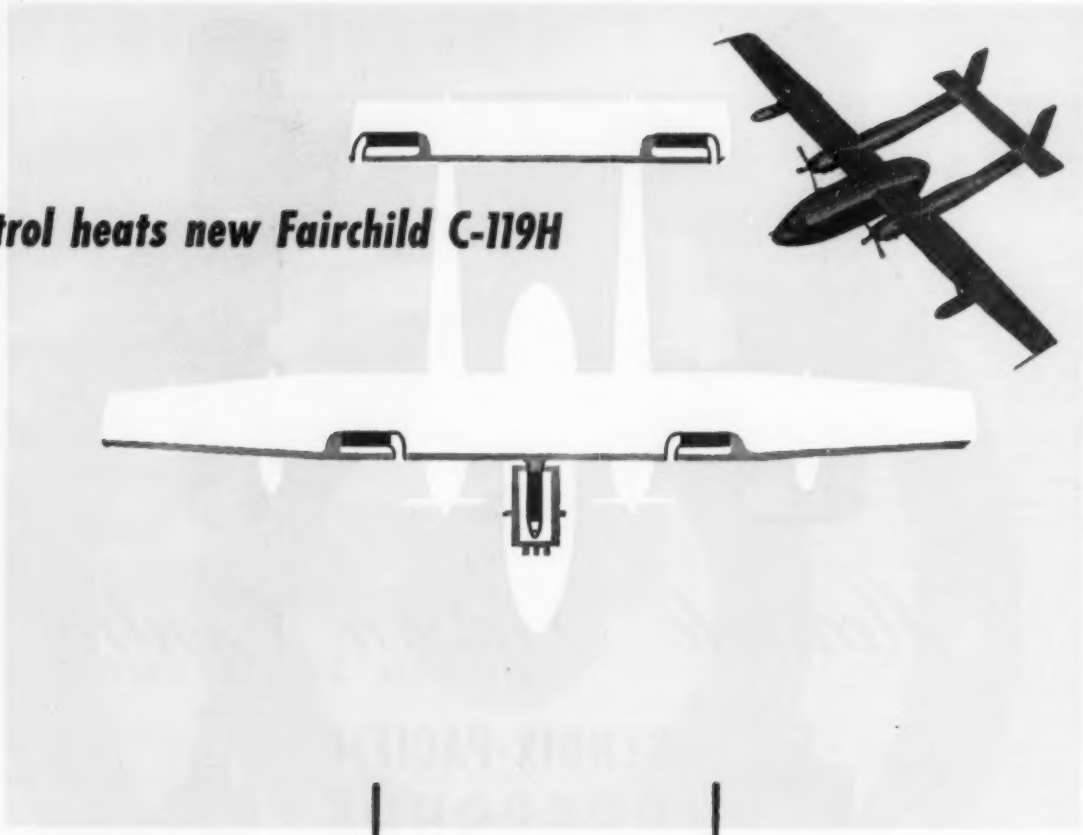
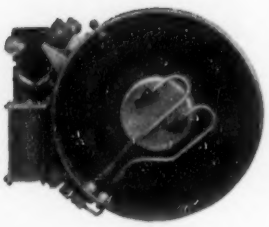
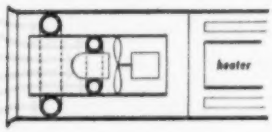
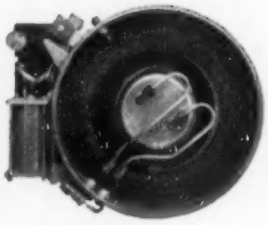
janitrol heats new Fairchild C-119H



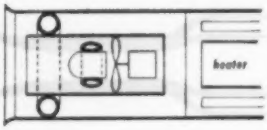


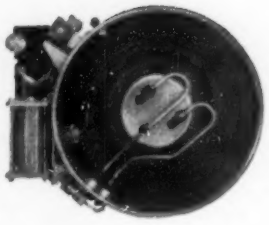
heater off
Inflatable air valves for both ram air and blower are fully closed.



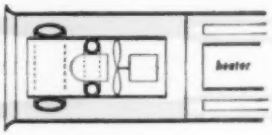


ground operation
Ram air intake automatically closed. Blower on and blower intake open.

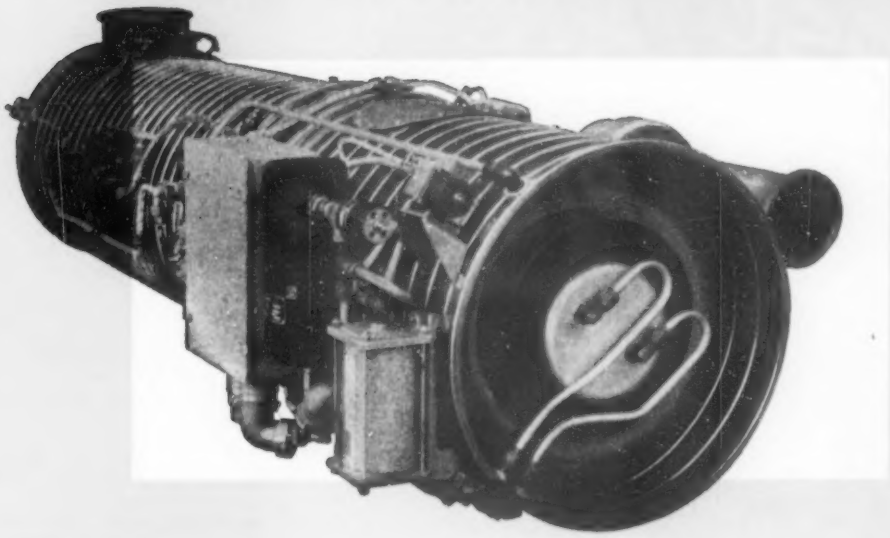




in flight
Blower is automatically shut off. Blower intake closed. Ram air open.



package units fully automatic and interchangeable



Inflatable air valves . . . modulating type fuel control valves . . . automatic blower over-run after shut-down . . . simpler-than-ever push button operation . . . interchangeability of components or complete units — these headline the brand new Janitrol S-600 heater packages, five of which heat the new C-119H. The inflatable air valves shown at left represent the latest simplification of air intake control, and have proved themselves in the severest tests. Modulation of fuel supply is another important innovation: the system idles during periods of low heat demand, thereby avoiding the sudden temperature changes which would normally be experienced with on-off cycling.

Of particular interest to airframe builders is the completeness of the package, furnished ready to bolt in place, virtually ready to "plug in." Interchangeability not only streamlines the installation work, but in addition, provides a new operational simplicity factor.

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adherence to established door rigging and inspection procedures at routine services.

On Sept. 15, 1952, the company issued an Operations Information Bulletin for insertion in all B-377 operations manuals. It included the above directives and the following:

Responsibility for Door Inspection

1. *When there is one flight engineer aboard, the Captain shall be responsible to assign a qualified crew member to make the after pressurization check covered in Item (4) above.*[4]
2. *The flight engineer shall be responsible for all ground checks of all hatches for security. Where there are two flight engineers on board, the flight engineer shall be responsible for all air inspections and checks of all hatches for condition and security. Where there is one flight engineer on board, the flight engineer shall be responsible for all air checks of all hatches for security after inspection by a qualified pilot has initiated a report of any abnormal condition or malfunctioning of any door engaging mechanism. The procedure outlined in the first section of this memorandum must be followed for all these inspections and checks.*

Although the flight engineer had been given a brief indoctrination of the B-377 exterior doors and their locking devices at the Boeing factory, apparently no continuing program of familiarization of such devices had been instituted by the company for either the flight crew or the cabin attendants. However, such a course has now been established and is in effect for all pertinent crew members.

The captain's formal schooling in connection with the doors had been more than two years before the accident, and there is no record of his having received any refamiliarization on the subject.

Of course, the B-377 operations manual which is required to be aboard the aircraft and is available to all flight crew members contains full information relative to doors and their operation.

Pan American World Airways temporarily suspended both Captain Fly and Flight Engineer Knight until the investigation of this accident was completed. The flight engineer was later discharged by the company, and the captain returned to flight status in his former capacity.

The Civil Aeronautics Administration took the following action as a result of this accident:

1. Admonished the company by letter to make all B-377 cabin attendants familiar with the locking of the cabin door sufficiently to allow them to recognize a hazardous condition, and to make flight crew members familiar with door mechanisms and safety devices.
2. Reprimanded the captain by letter for continuing the flight with a pressurized

[4] For the purposes of this report "Item 4 above" is in substance items 3 and 4 above.

cabin without taking further precautionary measures and ignoring danger warnings, but not for wilful disregard for the safety of the flight. A copy of this letter has been placed in the captain's airman certificate file, CAA, Washington, D. C.

3. The Miami office of the CAA recommended to the Administrator, Washington, D. C., that the airman certificate of the flight engineer be suspended for three months subject to its being renewed upon his passing a written, oral and practical examination administered by an authorized agent of the CAA.

FINDINGS

On the basis of all available evidence the Board finds that:

1. The carrier, the aircraft and the crew were properly certificated.

2. When the flight reached an altitude of 12,000 feet, the cabin pressure differential was 4.1 psi.

3. The main cabin door blew open in flight because it was not fully locked.

4. This unsafe condition was not recognized by the flight engineer.

5. The captain failed to evaluate properly the warnings and continued flight under pressurized conditions.

6. A passenger seated nearest the door was blown through it and lost at sea; none of the other occupants was injured.

7. Considerable damage occurred throughout the interior of the cabin.

8. Following the decompression the flight at once descended and returned to Rio de Janeiro.

9. The door locking mechanism and all its associated safety devices were inspected and found to be functioning normally.

10. The door frame seal loosened and sagged sufficiently to jam and prevent fully locking the door prior to take-off, resulting in a substantial air leak during pressurized flight.

11. Later tests revealed an air leakage due to loose metal screws in the door frame trim angle.

12. This leakage eventually deteriorated the bond between the door frame seal and liner.

13. The company did not maintain an adequate training program relative to exterior door mechanisms and safety devices on the B-377, so that hazardous conditions could be avoided.

PROBABLE CAUSE

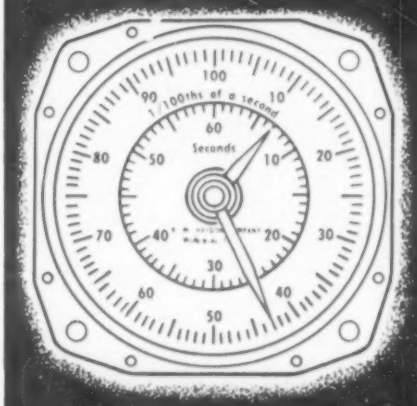
The Board determines that the probable causes of this accident were, (a) the flight engineer's failure to recognize an unsafe condition of the cabin door despite three completely separate warnings of that condition; and (b) the captain's action in continuing flight while pressurized despite the several warnings that the main cabin door was not properly locked.

By the Civil Aeronautics Board:

/s/ Donald W. Nyrop
/s/ Oswald Ryan
/s/ Josh Lee
/s/ Joseph P. Adams
/s/ Chan Gurney

NEW A. W. HAYDON COMPANY

STOP CLOCK



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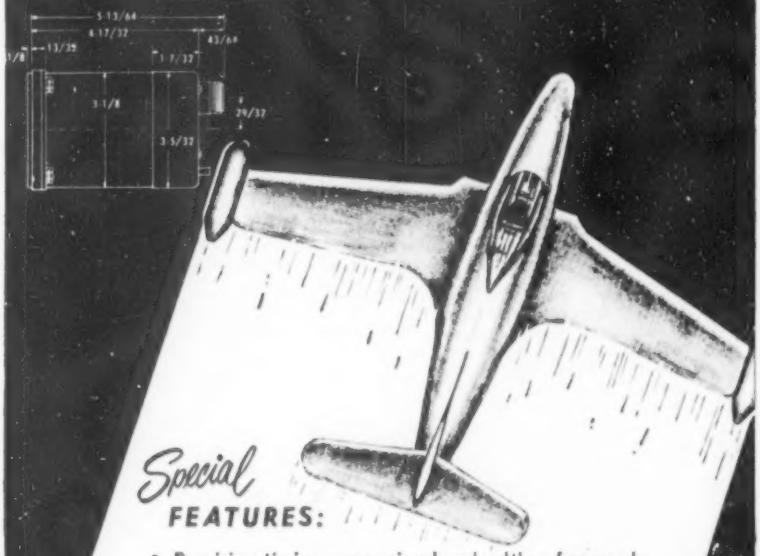

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MODEL'S RF signal level is measured by . . .

RECORDER to check antenna reception.

Flush Antenna Design Made Easier

Thompson range tests radiation patterns of scaled plane models, aiding elimination of radio blind spots.

A new system for measuring radiation patterns may solve the problem of designing flush-mounted radio antenna into airframes, a task made necessary by increasing aircraft speeds and use of very high frequency (VHF) and ultra high frequency (UHF) radio communications.

The system—developed by the Electronics Division of Thompson Products, Cleveland—is a series of components assembled into a "range" for measuring radiation pattern of small airplane antenna models. Both Convair and Grumman have bought the new Thompson range.

External antennas in the numbers required by modern aircraft add too much drag at today's military plane speeds and at tomorrow's jet liner speeds. The result has been a trend to flush-mounted antennas, built into the airplane's vertical or horizontal stabilizer, wingtips, etc.

▶ **Raise New Problems**—Although flush-mounted antennas solve the aero-dynamic drag problem, new communications problems arise because of line-of-sight propagation characteristics of VHF and UHF. The airframe manufacturer must find the optimum antenna design and location to provide a minimum number of "blind spots" for his particular airframe configuration in the directions in which the antennas must transmit or receive.

Solution to this antenna design problem involves judicious use of both theory and cut-and-try techniques. Because of the inter-relation of aircraft configuration and antenna performance, the antenna must be tested on the airplane in which it will be used. Expense and time involved in flight-testing antennas has led to the growing use of small-scale models that can be tested on the ground.

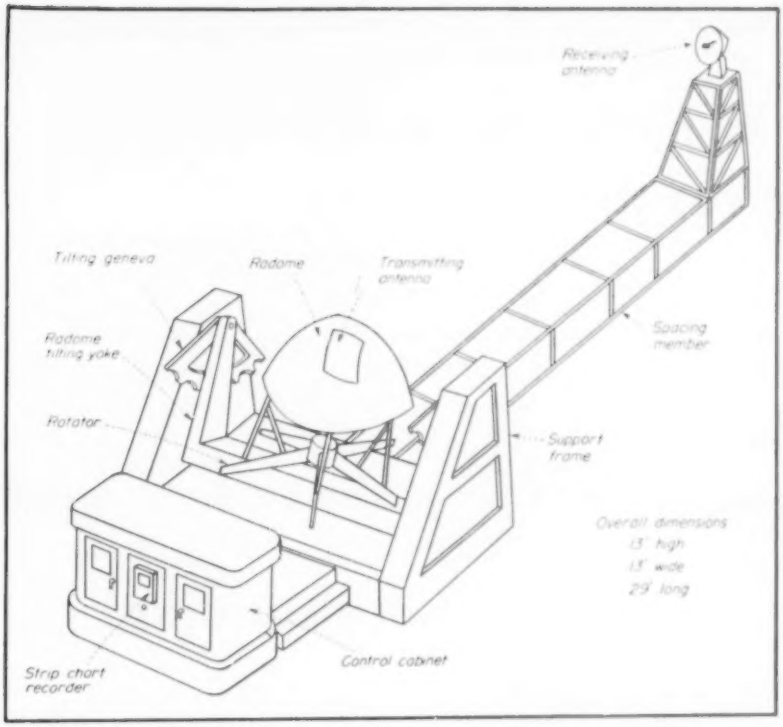
If the wavelength of the RF energy to be used is scaled down (frequency scaled up) by the same scale factor used in the airplane model, equivalent antenna performance data can be obtained. For example, if an airplane with a 50-ft. fuselage is constructed as a 2-ft. model (1:25 scale) for tests on a VHF antenna designed for operation at 125 mc., the model tests must be conducted with RF energy at a frequency of approximately 3,125 mc. (25 x 125).

Scale factors in the neighborhood of 1:25 normally are used.

▶ **Antenna Pattern Range**—Principal components of the Thompson range are:

• **Measuring tower.** Airplane model is mounted on this tower, which has provisions for rotating the model and indicating remotely its azimuth and elevation position.

• **RF power source.** Equipment generates microwave (above 1,000 mc.) RF energy and directs it at the model



RADOME TESTING RANGE is used to measure properties of radar housings.

airplane through a radiator horn.

• **Receiver and recorder.** A microwave receiver and a polar axis recorder automatically plot the RF energy level at the model's antenna as a function of the model's azimuth or elevation position.

▶ **Model Tower**—Two separate motors in the measuring tower are used to position the model to any desired azimuth and elevation angles. Two synchros, one for azimuth and one for elevation, transmit electrically to the polar recorder the information on model position. Model positioning motors are remotely controlled from the polar recorder panel.

Present scale model pattern measuring systems are used outdoors to prevent the model antenna from picking up reflected RF energy. To prevent the model from being deflected by wind, a sturdy support is needed. However, a large metal support can cause stray reflections of RF energy or shadows. Thompson Products has used a 4-in.-dia. Glasweld tube support, which is strong enough for heavy models while minimizing stray reflections. The support is canted slightly so that the model will rotate about the centerline of the base.

▶ **Power Supply**—Microwave energy, in the frequency range of 1,000 to 17,500 mc., is generated by a reflex-klystron tube. The klystron is square-wave modulated at a frequency of 1,480 or 1,520 cps. by interrupting its anode supply voltage. Modulating frequency is controlled by a tuning-fork oscillator. Both power supply and tuning fork oscillator are included in the RF power source.

The RF energy is beamed at the airplane models by means of horn radiators designed to give a 20-deg. beam width. A series of seven horns are available to cover the frequency range of 1,000 to 17,500 mc. Each horn is equipped with necessary fittings, feeds and matching equipment for tuning to obtain optimum match.

▶ **Receiver-Recorder**—This cabinet contains a microwave receiver consisting of a high-gain (80 db. maximum) linear amplifier, which can be fed from either a bolometer or a crystal detector (used to measure RF energy level) without any change in wiring. The amplifier has a four-cycle band-pass filter centered on the particular tuning fork oscillator frequency selected, to attenuate noise other than that at the modulated frequency.

The receiver output is fed to a polar recorder with a turntable rotated in accordance with azimuth or elevation position of the airplane model. The recording head distance from center is determined by RF energy level.

Two 4-in. indicator dials on the recorder panel show the operator the instantaneous azimuth and elevation position of the model. Nearby switches and Variac controls allow the operator to adjust the position and speed of rotation of the model.

▶ **Other Products**—Among other products of TP's Electronics Division are:

• **Radome tester.** This large piece of equipment is used for transmission and reflection co-efficient measurement of microwave radomes. It tests effectiveness of various radome designs and the quality and strength of signals as received through the radome from various angles. The device can measure in 15-deg. slices from vertical to 15 degrees below horizontal, TP officials say.

• **Coaxial sensing switches.** Also included in TP's electronics' line is a wide selection of coaxial sensing switches used in distance measuring equipment.

Servo Solenoid Valve

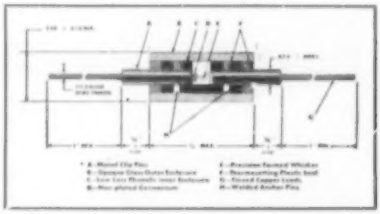
A new solenoid valve designed for use in servo systems where electrical signals are used to control the movement of hydraulic actuators has been announced by Standard Controls, Inc. The new Model PC-1 can operate at supply pressures of 500 to 3,000 psi. and has a power capacity of 4.2 hp. at 3,000 psi., the manufacturer says.

Maximum output differential pressure is obtained from the servo valve with an 8-ma. differential current input to the two 700-ohm solenoid actuators. The unit weighs 1.4 lb. and its dimensions are 2x2x3½-in.

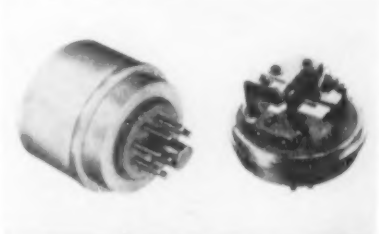
Standard Controls, Inc., 1230 Poplar Place, Seattle 44, Wash.

Small Components

New miniature components designed to help engineers cut the size and weight of avionics equipment include:



• **Rugged germanium diodes** are double-sealed, first in plastic and then in a glass enclosure, and use welded anchor pins to maintain cat's whisker adjustment. Available from International Rectifier Corp. (1521 East Grand Ave., El Segundo, Calif.)



• **Highspeed relay** with pull-in time of 120 microseconds and a 100 microsecond drop-out time, according to the manufacturer, can operate 2,500 times

SIMPLICITY in hydraulic pump design is important for these reasons:

The Pesco hydraulic pump is a gear design—the simplest of all hydraulic pumps. There are actually only three moving parts in the pump proper. Fewer moving parts mean—

. . . less chance of pump malfunction
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plus the EFFICIENCY of "Pressure Loading" which makes possible:

"*Pressure Loading*" is Pesco's exclusive development that *automatically* holds end clearance of gears to a thin film of oil, thereby maintaining the volumetric efficiency throughout the long service life of the pump.

. . . volumetric efficiencies up to 97% over a wide range of temperatures

plus STATISTICAL QUALITY CONTROL which assures:

. . . uniform high quality and performance of each pump
. . . a longer, trouble-free service life

Simplicity of design, *efficiency* of "*Pressure Loading*" and *statistical quality control* in all phases of manufacture, are three important reasons why Pesco pumps are standard equipment on military and commercial aircraft and on many automotive and industrial products. Write today regarding your hydraulic pump requirements.

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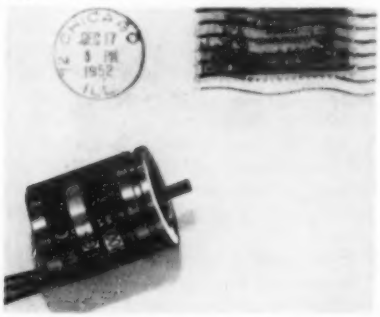
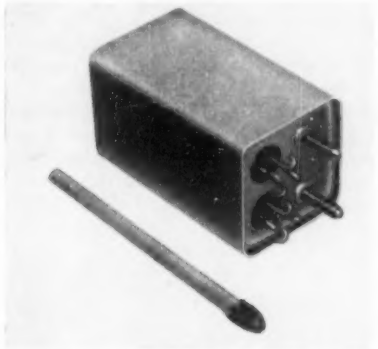
per second. The new Type T relay comes in a sealed plug-in case. C. P. Clare & Co., the manufacturer, says relay has operated 5 billion times with a 0.75-ma. load over a six-month period without readjustment following an initial run-in period. Described in Bulletin 117. (4719 West Sunnyside Ave., Chicago 30, Ill.)



• **Servo motor** only one inch in diameter and one inch long, with 2-, 4-, or 8-pole construction for supply frequencies of 60 to 400 cps, and with stall torques of 0.25 to 0.35 oz.-in. has been announced by G-M Laboratories, Inc. (Dept. F, 4300 North Knox Ave., Chicago 41, Ill.)



• **Sealed relay** is hermetically sealed, weighs 3½ oz., and reportedly meets the shock requirements of MIL-E-5400. Available in DPDT style with coil resistances up to 15,000 ohms from Phaostron Co. Relay contacts are rated at 3 amps, 28 v. d.c. (151 Pasadena Ave., South Pasadena, Calif.)

FILTER CENTER

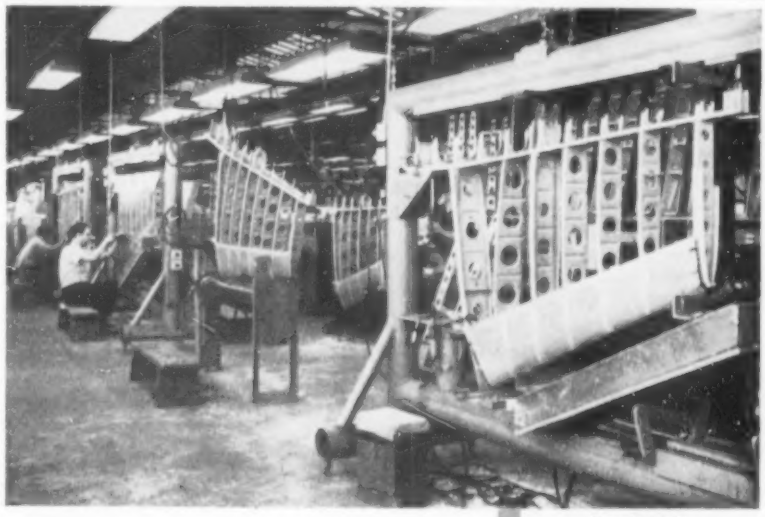
▶ **New Transistor Supplier**—Hydro-Aire, Inc. of Burbank, Calif., expects to be in full production on point-contact transistors by June. Company says it will be the first western source for transistors.

▶ **B-50 Groomed for Auto-Flight**—The USAF expects publicly to demonstrate its latest automatic flight techniques early in 1954 in a B-50 now being outfitted as the successor to the All-Weather Flying Division's C-54 which made a hands-off flight to England in 1947. The B-50 is now at Sperry Gyro's MacArthur Field on Long Island for installation of some Sperry-built equipment.

▶ **Wescon Calls for Papers**—Western Electronic Show and Convention to be held Aug. 19-21 in San Francisco has issued a call for technical papers to be presented at that time. Prospective authors should send title, a 100-word abstract, and a 500-word summary of proposed paper for evaluation to B. M. Oliver, Hewlett-Packard Co., Palo Alto, Calif., before May 1.

▶ **Westinghouse Eyes Airline Radar**—Westinghouse Electric Corp., whose APG-35 intercept radar used on the F3D has recently made news in Korea, is actively interested in the airline weather warning radar field and has made a proposal to a major U. S. airline.

▶ **ERA to Display New Computer**—Engineering Research Associates Division of Remington Rand, Inc., will show its new ERA 1103 general-purpose digital computer at the national IRE convention in New York, Mar. 23-26. ERA says unit has "large internal storage capacity, high operating speed, and great programming versatility. —PK



Above F-84 fins and rudders by EDO

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A FEW EXAMPLES OF EDO CRAFTSMANSHIP

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EQUIPMENT

New Tubing Fittings Cut Leakage

Weatherhead attacks leaks with banjo and flareless units that eliminate joints, reduce tube breaks.

By George L. Christian

Cleveland—A new multiple-type cluster or banjo fitting, now in production at the Weatherhead Co. plant here, is saving weight and space and reducing leakage in many of Navy's new jets, the manufacturer reports. It also simplifies installation of aircraft hydraulic systems.

The new cluster fitting, developed by Weatherhead and Douglas Aircraft Co.'s El Segundo Division, is used in the Douglas A2D-1 Skyshark, AD-5 and -6 Skyraider, A3D-1 twin-jet bomber and F4D-1 delta-wing Skyray, according to H. E. Cornish, Douglas engineer. The fitting is going into future Douglas designs also.

▶**Fewer Joints**—Weatherhead's cluster fitting is simply a collection of several fittings in one. It eliminates as many as four joints, thereby reducing a major cause of leakage in aircraft hydraulic systems. Cluster fittings also help to eliminate cumbersome manifold blocks that take up much room and are another source of leakage because of the many joints they contain.

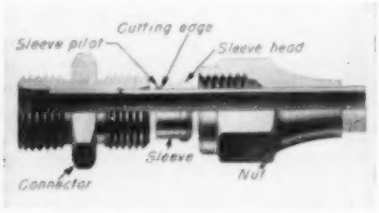
Individual banjo fittings may be swiveled on their bolts to take care of tubing misalignment. They simplify hydraulic system installation in an airframe and facilitate periodic tube replacement. The fittings permit great flexibility of installation because their component parts may be arranged in almost any desired combination of positions. The fittings come in high- and low-flow designs.

▶**Flareless Fitting**—Navy is swinging to Ermeto flareless aircraft tube fittings, another Weatherhead product, according to B. R. Teree, the firm's chief engineer. Several large commercial airlines are using Ermeto fittings and are pleased with them, Teree adds.

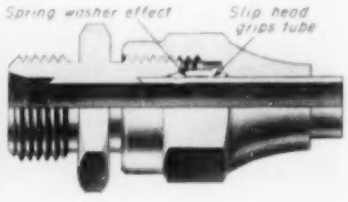
A number of airframe manufacturers are putting the fittings on production aircraft. These companies are Chance Vought Div., United Aircraft Corp., Dallas; El Segundo Div., Douglas Aircraft Co., El Segundo, Calif.; McDonnell Aircraft Corp., St. Louis; and North American Aviation, Columbus, Ohio.

Weatherhead holds the license for Ermeto fittings, and has, in turn, licensed other U. S. manufacturers.

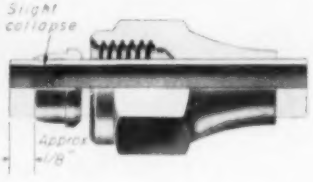
Tubing used in Ermeto-equipped aircraft piping systems need not be flared, threaded, soldered or welded, Teree says, saving time and money. Elimination of flares removes a major cause of leaks and breaks in aircraft hydraulic systems. Tubing need only be cut reasonably square and the cut end burred inside and out to prepare it for the fitting.



FLARED fitting goes on squared tube . . .



NUT is tightened to grip tubing . . .



DISASSEMBLY checks sleeve position.

▶**Quick Assembly**—Fitting is put together speedily. The tubing is bottomed securely on the connector seat; nut is made finger-tight, then given a final twist (one turn for aluminum tubing up to ½-in. outside diameter, 1¼ turns for larger sizes of aluminum and all stainless steel tubing). These operations are called presetting.

The joint is then disassembled to check presetting. Correct presetting means that the cutting edge of the sleeve has bitten into the tube sufficiently to prevent it from moving along the tube. Sleeve may rotate on the tube. Sleeve pilot should be in contact with the tube or within .005 in. of it. Approximately ⅛ in. of tubing should protrude in front of the sleeve to prevent blow-off in service. A slight collapse is usually evident on the inner wall of the tubing at the ring cut.

Connector threads, nut and seat should be lubricated with a good lubricant and connector and sleeve sealing surfaces must not be nicked or scored. Weatherhead recommends that all tubing assemblies be proof-pressure-tested before installation.

On installation, nut is tightened until considerable increase in resistance indicates that sleeve is touching connector; then it is given another sixth of a turn.

▶**Presetting Machine**—Weatherhead has developed a presetting machine, MT-10044, that promises to be a valuable timesaver in production-line tubing assembly operations.

The machine allows an assembly rate of 140-200 units an hour. The finished fittings then need only a slight twist after positioning in the aircraft.

The presetting machine consists of a double-acting tandem piston that drives a ram into the sleeve which is held in a vise jaw. Ram presses sleeve onto tubing with just the right pressure. Machine handles tubing in sizes from ¼ to ¾ inch.

▶**Around the Shop**—Weatherhead's laboratory is in the initial stages of testing hose couplings for a new bullet-proof hose that is designed to take slugs up to .50 cal. and seal the holes within 30 seconds. The tests should be completed in a month or so.

The lab is also vibration-testing Ermeto fittings on flexible hose for high-pressure systems.

Stratos 'Wrings Out' Air Cycle Unit

Airborne aircraft equipment is now called on to do such rugged jobs that it must first go through rigorous test programs to prove its capabilities. The "wringing out" of a new air cycle refrigeration unit made by Stratos Division, Fairchild Engine and Airplane Corp., is a good example to illustrate this point.

The unit, going into North American's F-86Fs, as part of the NURH15 refrigeration package, weighs 7 lb., has a turbine air flow of 18.5 lb./min., and measures 9½ X 7¾ X 6⅝ in. (with ducts). Package inlet pressure, including heat exchangers, is 220 in. Hg abs. Turbine discharge pressure is 37 in. Hg abs.

The machine was first put through the standard production test with inlet temperatures of 212F and turbine speeds of 72,000 rpm. Stratos does not

reveal the unit's operating pressure. Outlet temperature was 27F. It was then put through the following tests:

• **Life.** Conditions approximating 100F ambient temperature and full power engine operating conditions were set up. Turbine operated continuously for 95 hours at 78,000 rpm. with inlet air temperatures of 230F. Air outlet temperature was cooled to 30F.

• **Temperature.** Machine was operated for half an hour with inlet temperatures to second (blower) heat exchanger of 600F to simulate failure of ram heat exchanger.

• **Pressure.** Inlet pressures of 265 in. Hg were imposed on the machine for five hours. Pressures were cycled from production test pressure to the 265 in. Hg every 15 minutes.

• **Flight attitude.** Turbine package was operated continuously for 10 minutes in inverted position while turbine was accelerated from 0 to 72,000 rpm. every two minutes. Time taken to reach maximum speed was three seconds. Same tests were run with the unit in 85-deg. climb and 85-deg. dive positions. Then machine was inclined to a 30-deg. climb, operated 15 minutes at 72,000 rpm., stopped, leveled and the cycling test repeated. This procedure was repeated with machine in a 30 deg. dive position.

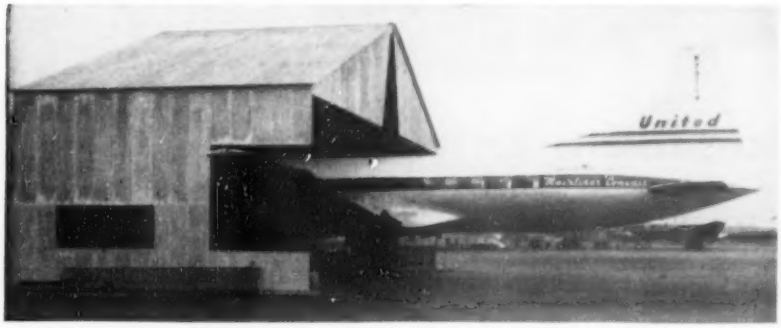
• **Winterization.** Machine was "soaked" in a Tenney (cold) chamber for one hour at −75F. Oil temperature dropped to −67F. Turbine was started by opening gate valve, which took 4 sec. Five seconds later, turbine had reached its maximum operating speed (at that temperature) of 65,100 rpm. with 70F inlet air. When turbine inlet air temperature was raised to 130F, unit's temperature climbed to −45F, speed went up to 73,000 rpm. and outlet temperature stabilized at −50F.

When all these tests were completed, the same unit was run back through the standard production test. It duplicated exactly the performance it had given 150 hours earlier, Stratos says.

OFF THE LINE

Airport emergency power in a small package is supplied by a 150-lb. Powerhouse 3,000-watt a.c. generator compactly mounted on a 6-hp. Wisconsin engine and driven by V-belt. Lynn Engineering & Supply Co., Russ Bldg., San Francisco 4.

Trans-Canada Air Lines, eight Super Constellations will have 54 tourist seats and nine first-class seats when the new airliners are put into service next year. Here is the distribution: forward compartment, 15 seats in a three/two arrangement; main compartment, 35 seats in a three/two arrangement plus a last row of two/two. Lounge has two first-class seats and a relaxing area, while the aft compartment has seven first-class seats in two/two and two/one positions.



LOW-COST MAINTENANCE DOCK

Two of these low-cost aircraft maintenance docks have been erected, one for United Air Lines at New York International Airport, the other for American Airlines at Logan Airport, Boston. Designed by Luria Engineering Co., the docks are being mass-produced at Luria steel-fabricating plant in Bethlehem, Pa. They are made of a rigid steel frame structure, galvanized steel sheet roofing and siding (other material may be substituted) and a masonry boiler room. Dimensions: Dock—50×70 ft., 18½ ft. high to the eaves; lean-to—20×20 ft.; boiler room—10×15 ft. Luria says the dock is cheaper than conventional hangars. It has canvas curtains and sleeves to close up front and side wing slots; can take any size single-, twin- or four-engine commercial aircraft without requiring lowering of antenna. Structure can be assembled rapidly without riveting or welding because of pre-engineering at manufacturing plant. Furnace unit furnishes oil-heated air in the winter and circulates fresh air in the summer. Building is provided with double sliding doors in the rear of the lean-to to provide an exit for tugs towing aircraft into position. Additional sliding doors in the end wall give maintenance personnel access to the building and provide a means for bringing in work stands and other overhaul requirements.

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It increases maximum extrusion size from a 15-inch to a 23-inch circumscribing circle —or from 600 pounds to 2,300 pounds per piece! This press is another step in Alcoa's "big press" program giving better service to America's aircraft industry.

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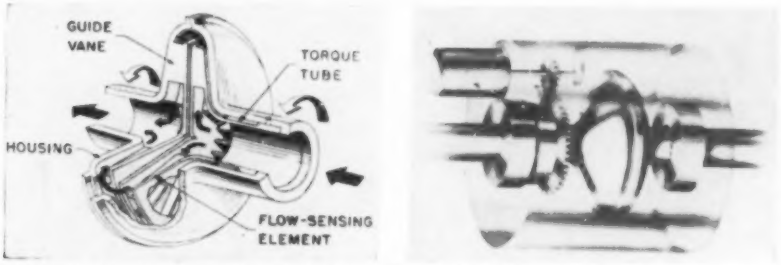
NEW AVIATION PRODUCTS



HEART of typical unit is at left; phantom view at right shows entire meter.

New Meter Measures Mass Flow

A great advance in flow-measuring techniques is seen in the development by Control Engineering Corp. of a meter that reportedly responds only to mass flow and is insensitive to volume.

The instrument is capable of measuring the true mass rate of anything that will flow or fall through a pipe, according to the company. It is said to be independent of density, volume, temperature, pressure, viscosity, compressibility or external accelerations which affect the readings of other types of flowmeters. Among other uses, the maker suggests that the meter can give a direct and accurate reading in pounds of fuel reserves aboard aircraft.

Operation is based on measurement of the torque required to give a radial acceleration in the rotating flowmeter to the mass under study. This torque is said to be dependent only on the dimensions of the flowmeter, rotational speed and the mass flow.

Advantages cited for Control's True Mass Rate Flowmeter include:

- **Works with multiphase fluids** such as mists, foams, slurries and emulsions, as well as with homogeneous fluids. Aerated powders, particles carried in vapor, and pieces falling by gravity can be measured.
- **Reads flow in either direction**, and output reverses when flow reverses.
- **Response speed is high enough** for accurate measuremeent of very rapidly changing flows. Gives precise indications of the average values of pulsating flows.
- **Wide range of flow rates** can be measured.
- **Unaffected by gravitational** or other translational accelerations.
- **Pressure drop** through instrument is small.

Some models of the new flowmeter are already in use, but production is restricted to meeting vital industrial and military needs, the manufacturer reports.

Control Engineering Corp., Norwood 100, Mass.

Airfreight Cost Cut

U. S. Plywood sees a big airfreight potential for Tekwood (MIL-V-4338, USAF), a paper-wood product developed by the firm for shipping containers. Tekwood is thinner and lighter—but under many conditions tougher—than plywood.

The product can raise payload, eliminating half and more of the weight lost in packaging, the company believes. The aircraft industry already accounts for about 50% of Tekwood sales, it reports. Boeing, North American, Republic and other airframe makers have used this new panel board in their packaging departments. It is cheaper than plywood and easier to cut and handle.

There is a weight limit beyond which Tekwood cannot be used, but it is suitable for many aircraft components. One aircraft company estimates that ¼ of its parts can be packaged in the thinnest Tekwood size, ⅛ in. Even major assemblies such as landing gear, fuel tanks and empennage can be packaged with the material.

Tekwood consists of a thin hardwood core bonded to Kraft paper. The panel is then mounted on a wooden frame. Its strength-weight ratio is said to be higher than plywood of the same thickness; its weight is from one-half to one-fourth that of plywood commonly used in packaging. When used in place of lumber, it can cut weight by up to nearly 90%, the firm states.

Tekwood is being tried also in die blankets for drop-hammer beds. It is said to enable more precise forming of sheet metal parts at lower cost than provided by softer neoprene rubber padding which it replaces.

U. S. Plywood Corp., Tekwood Division, 55 W. 44th St., New York 18.

Prevents Freeze of Fire Truck Water

A monitored circulation system is being used in American-La France-Foamite-built Air Force fire trucks to prevent water supply from freezing in cold weather.

The monitoring system, based on Fenwal Thermoswitch units, automatically operates circulating pumps which push the water through a heat exchanger when water temperature drops below a safe level. Heat is supplied by ethlene glycol brought to temperature by a thermostatically controlled 90,000-Btu. gasoline heater.

One Thermoswitch, set at 60F, is installed in an exposed line. A second unit, in the circulating line through which heated water passes, is set to close at 40F, a drop to this temperature indicating that the heating system is not working properly. The switch warns of this by sounding the truck's horn.

Fenwal, Inc., Ashland, Mass.

Eccentric Wheel Speeds Cutting

A cutting wheel that moves in an eccentric path as it rotates is said to be one of the keys to the faster action and longer wheel life of a new metalworking machine developed in Great Britain by L. J. H. Ballinger, Ltd. Other important features are the equipment's hydraulic surge cooling system and indicator that enables operator to determine and adjust feed pressure visually.

The company claims that its machine cuts Nimonic high-temperature alloys, boron carbide and other hard materials without burning or hardening, and with virtually no burr. Generally no lathe refacing is needed and accuracy is within .005 in. for parallel cuts.

The eccentric wheel action is designed to produce a cut of greater radius with less pressure. Also, since the wheel is lifted from the work in each revolution, coolant can flow between the cutter and the work, carrying away grit.

The machine is being distributed in this country by Douglas Export-Import Corp., 17 Battery Pl., New York 4, N. Y.

Building-Block Radio

A radio system to which sections can be added for expansion—providing anything from a simple private plane set to an all-purpose model suitable for executive transports—has been unwrapped by Lear, Inc.

The equipment can be shifted through 19 different combinations, from a basic LF receiver to a set fitted

both for LF and VHF two-way communication and navigation. Transmission on as many as 24 crystal-controlled channels is possible.

Speed Limiter

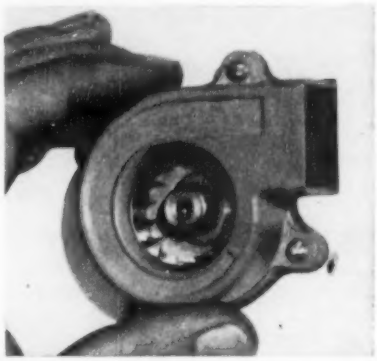
A speed control switch to prevent overspeeding and runaway in aircraft engines has been developed by Kahn & Co., Inc.

The control, KC-223, can be adjusted for a maximum allowable speed—normally in the range between 1,600 to 3,200 rpm.—above which it actuates any suitable control (this may be a relay circuit which grounds the magneto).

The engine cuts in again at a speed 100-300 rpm. lower than the switch setting. While no resetting of the circuit is required if repeat action is wanted, it may be wired to shut down the engine permanently after the first overspeed.

The device can be installed directly on standard tachometer generator drive pads, AND-10005, Type I and II, and the AND-20005, Type XV A. As most aircraft engines have two such pads, the control need not interfere with normal speed indication. The unit also adapts to the AND-10005, Type I engine drive, and can be modified for others. It is equipped with an AN3102-10SL-3P connector for hook-up to external circuits.

Kahn & Co., Inc., 3324 Main St., Hartford 1, Conn.



Avionic Blower

A series of miniature blowers for cooling avionic equipment have been developed by Electroflow Pumps, Inc.

The blower consists of a backplate and a scroll, which directs the flow of air produced by the enclosed blower wheel. It is available in four sizes.

To withstand the drastic temperature changes characteristic of highspeed, high-altitude flight, the scrolls have been constructed of a new alkyd plastic reinforced with fiber glass. This is said to give them high impact strength and enable them to withstand an instant change from —55C to 125C.

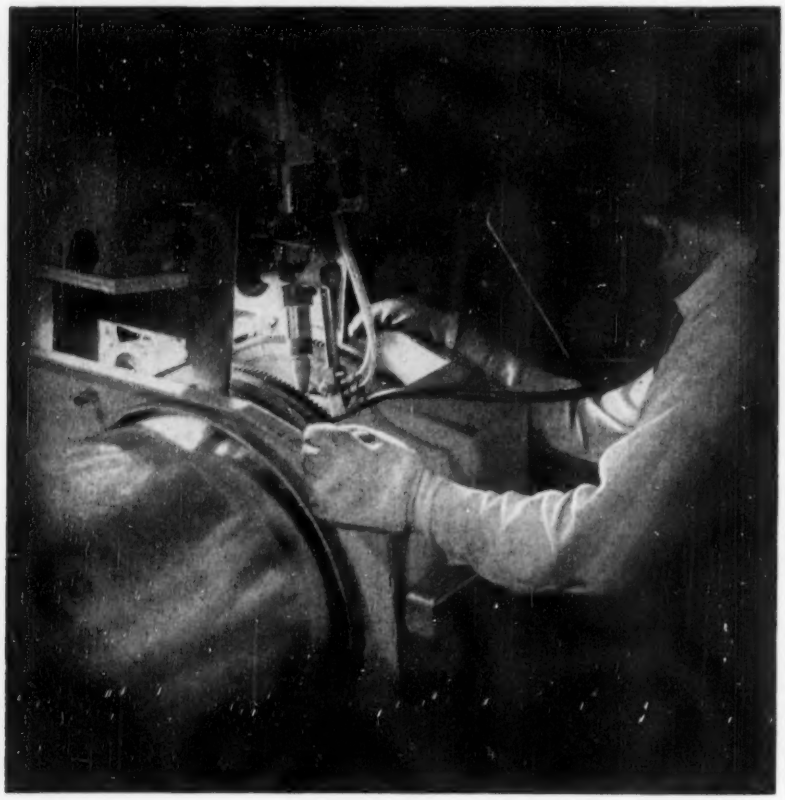
The wheels are aluminum or cadmium-plated. The blowers are driven by a 400-cycle or variable-frequency electric motor.

Electroflow Pumps, Inc., 4811 Anaheim-Telegraph Rd., Los Angeles 22.

Broaching Machine

A horizontal broaching machine with a special trunnion fixture for broaching internal angular slots in jet engine ring segments has been developed by Colonial Broach Co.

The machine is designed for flexibility so that indexing, angle of cut



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Flexible Metal Throat Feeds Fire in the Sapphire

Here's the new Wright J65 (Sapphire) Turbojet engine—*and* the TITEFLEX® metal hose throat through which it gets its fuel. Flow must be regular and unfailing and the fuel line must be leakproof.

TITEFLEX Flexible All-Metal Hose fuels the J65 Jet because TITEFLEX has *all* the qualities essential to safety and efficient service. Its convoluted wall structure assures flexibility and freedom from the constant stretching and compression that take place in continuous solid-wall tubing. Its all-metal construction provides great strength and safe, faultless performance under critical pressure, vibration and temperatures.

With years of outstanding service in the aviation industry, TITEFLEX today leads the aviation field in metal hose developments. You'll find TITEFLEX preferred for such applications as flexible shielding conduits and ignition harness; oil and fuel lines; flexible air, water and hydraulic connections. TITEFLEX Engineers and Designers have a vast knowledge of TITEFLEX performance and its unlimited possibilities. Original design work and problem-solving are important parts of our business. Let us help you solve your connection problems. Write for literature.

Close up of Titeflex fuel injection lines for the Wright J65. Tested for temperatures from —70°F to +600°F and for pressures up to 500 p.s.i.

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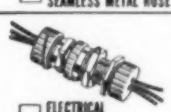

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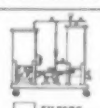

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Valve Talk

for WM. R. WHITTAKER CO., Ltd.

by Marvin Miles,
Senior Member, Aviation Writers Assn.

From 8000 feet up the carrier's deck looks like a chewing gum wrapper, motionless except for a filmy wake and a trace of smoke curling aft from her stack.

She's as cute as a bug's ear... until you suddenly realize that your Skyraider pilot is going to put down on that gum wrapper... and in less than half its length! You remember grimly what some Navy jockey once told you: "Every carrier landing's an incipient crash."

As you circle lower your pilot comes on the intercom to remark laconically: "She's pitching... the deck's a bit bad... but no strain... we're going down... all set?"

You cinch up your shoulder straps and glance again at the flattop. It's bigger now... but he's so right about that deck. It won't stay put. Her bow rises slowly, ponderously, in the long blue swells, then smashes down in a smother of foam while her stern heaves upward.

At 100 feet off the water, with wheels down, flaps down, hook down, you slip into the final 180 turn to line up with the pitching deck and go up the groove.

There's a glimpse of the landing signal officer holding an outstretched "roger" on you with his paddles. The engine blast dies abruptly and the fantail whips beneath you some 30 feet down.

That sinking feeling grabs you for a second, then a slamming impact jars you numb, followed almost instantly by a hard pitch into the shoulder straps as the Skyraider's hook snags an arresting cable that hauls the plane up short—in a little less than 100 feet.

"No strain," the man said.

On board a CV, flight operations are an amazing blend of coordination, control and teamwork. The planes chase each other around the traffic pattern, curving at close interval through a wide sweep from 1000 yards off the port quarter to land, unhook, move up and roar away across the bow again in deafening merry-go-round.

The timing in this three-ring circus of speed and power is fascinating. Every man—pilots, LSO's, deck crews, controllers—must work in perfect unison to keep the thundering circle swinging like a sweep second hand as the carrier plows into the wind.

Jet operation varies little, except that the screeching fighters are shot off the bow catapults, first trembling for a moment under the full surge of power before blasting away like a rock out of a sling, hitting 120 knots in 80 feet as they leave the bow.

At times the CV's deck is crowded with traffic, with one jet being launched from the starboard catapult, another turning up on the port side, a third coming up on the elevator from the hangar deck, a fourth moving up after landing and a fifth whistling in over the fantail.

If you think this is the height of precision and timing you should watch the night flying. "Paddles," the LSO, is even more alert in bringing the planes aboard. He shades them much closer, waves them off more frequently. The night I watched featured a panoply of stars, but no moon—a good night, but not the best.

Off the port quarter a destroyer paced the carrier, her mast lights marking the downwind turning point. Pilots rarely see the water and must fly the approach pattern by instruments until they can see "Paddles" pinpointed far aft on the ship by a black light that illuminates his paddles and the colored stripes on his flying suit.

Deck crews are especially on the ball. In the blasting darkness only about one-third of the deck, from the fantail forward, is dimly lit by "dustpan" lights. They remain on for qualifying trials, but in combat they're turned on only briefly for landings.

You see the planes only as skimming lights and they seem to sweep in much faster than during daylight. Once down, their landing lights are snapped off and the ships roll forward like ungainly puppets answering the weird gyrations of red signal wands in the hands of invisible controllers.

Then they're off again, thundering up the lane of red lights that mark the deck, their exhausts fretting the night with blue fire as they roar away.

You'll go a long way to top the precision of carrier operations and the skill of carrier pilots. In my book, it's the toughest assignment a plane can have.

The jarring landings day after day, night after night, are tests, not only of men and aircraft, but the myriad equipment that makes up these aircraft. Whittaker valves, for instance, take this slam-bang treatment without hitch.

Whittaker takes its hat off to Navy air and is proud to have a small part in its achievements.

and diameter of the work can be adapted to the requirements of the job.

For angular cuts, the fixture permits an adjustment of 15 to 45 deg. Variations in workpiece diameters are accommodated by changing the internal support ring in the fixture. An index mechanism on top of the fixture operates a rotor which turns the work in accurate increments according to needs of the job. Power for indexing is hydraulic.

Here's how the broaching machine operates:

The ring segment is mounted in the fixture; fixture is horizontally shuttled into broaching position; broach cuts slot; fixtures recede from broach; part is indexed one increment and procedure repeated until all slots are broached; rapid traverse rotates part to unloading position where it is pneumatically ejected.

Capable of fully automatic operation, the machine permits single indexing, or independent inching motions for all hydraulic units, including forward and reverse. It can be shipped in three separate sections for assembly in the shop.

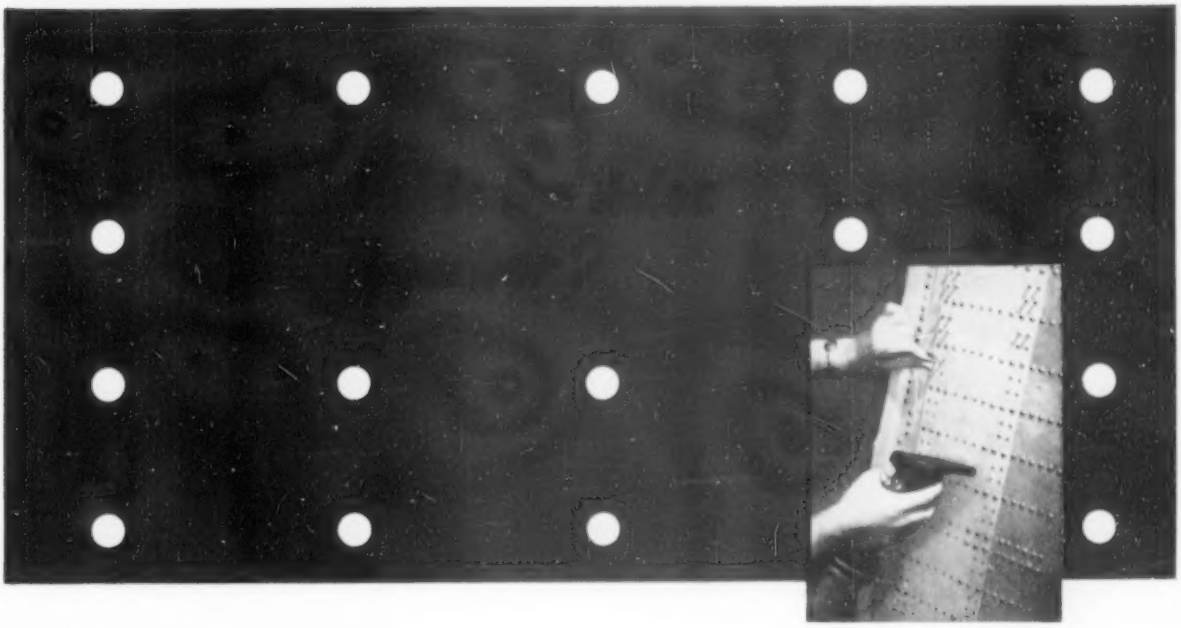
Colonial Broach Co., P. O. Box 37, Harper Station, Detroit 13, Mich.

Steering Unit

A power package for nosewheel steering, improved to save space and weight, has been announced by Bendix Products.

Mounted directly above the nosewheel, the equipment replaces the torque link on the nose strut, combining the link functions with steering in a single, simple mechanism. Easier maintenance is cited as one of the gains for the unit.

Steering is accomplished hydraulically with power cylinders. They replace the upper torque link of the usual shock strut scissor, while the lower link remains essentially the same. The system is controlled by a lever-operated valve in the cockpit. This same unit also

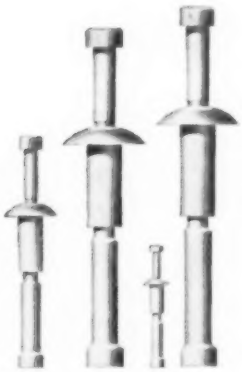


"A plane is a collection of aluminum holes held together by rivets," an aircraft designer once said jokingly in emphasizing the importance of rivets to aircraft construction. The majority are solid rivets which are driven and bucked by conventional methods. But a vital minority are actually precision parts, such as Cherry Blind Rivets, of which as many as 250,000 are used in one super-bomber—60,000 in a smaller fighter or transport.

These ingenious fasteners are set quickly and easily by one man from one side of the work with a special tool that pulls the rivet tightly into place without bucking, hammering or exploding. Blind rivets are virtually indispensable to modern plane construction as their use makes possible riveting in difficult-to-reach places, thus permitting freedom of design not possible with other types of fasteners. This feature also enables manufacturers to cut unit costs and speed production.

Townsend's Cherry Rivet Division at Santa Ana, California, is dedicated to the production and perfection of this single product. Here, highly trained personnel using Townsend designed and built equipment devote their entire attention to the manufacture of these precision rivets which are matched and tested against an elaborate set of specifications in order to give the excellent performance required. The greatest portion of Cherry Rivet production goes into military aircraft and will continue to do so as long as the nation's aircraft needs remain critical.

Cherry Blind Rivets are only one of some 10,000 different types, sizes and kinds of Townsend fastening devices produced at its several plants. With all these items at their command, Townsend engineers are able to give you unbiased advice—help select or design the fastener best suited for your product or assembly methods. A folder describing Townsend fasteners which are used to increase efficiency and improve products is yours for the asking.



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Bendix Products Division, Bendix Aviation Corp., 401 N. Bendix Dr., South Bend 20, Ind.

Gasket Seal

Gask-O-Seals, designed to replace AN 736 flat gaskets and ". . . eliminate . . . accumulative tolerances of O-ring-in-groove sealing . . ." have been developed by Franklin C. Wolfe Co.

The firm says the new seal, for aircraft hatch covers, access doors, hand-hole covers and others uses, has shown its capacity to reduce costs and weight and permit easier installation.

The sealing gland is mechanically bonded to a flat metal surface in a machined groove. There is said to be no cold flow under either high or low pressures and the part is claimed to provide a virtually perfect seal with low bolt torque. The rubber is fully retained and cannot blow out and assures a full metal-to-metal contact of the fastening surfaces, according to the firm.

Franklin C. Wolfe Co., 3644 Eastham Dr., Culver City, Calif.

New Literature

Miniature low-cost, high-operating Tyniswitch is described and specifications given in 6-page bulletin being distributed by maker, Sessions Clock Co., Forestville, Conn.

Electrical equipment laminations are comprehensively covered in 123-page catalog which also described Allegheny Ludlum Steel Corp.'s magnetic shield fabricating facilities. Address: Rm. 2036, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

Aircraft bolts and fasteners are described in catalog issued by Aircraft Bolt Corp., 701 W. Garvey Blvd., El Monte, Calif.

Greer Topics is new house organ published by Greer Hydraulics, Inc., describing the firm's operations and its diversified testing equipment. Write the company at 454 18th St., Brooklyn 15, N. Y.

Dual-Lock high-load structural fastener is featured in new 36-page catalog 1252 providing technical data on numerous Simmons models. Write Harry Rose, general manager, Simmons Fastener Corp., No. Broadway, Albany 1, N. Y.

Efficient Pickling with Rodine, bulletin 13, describes in detail processes for removing oxide film from iron and steel. Write American Chemical Paint Co., Ambler, Pa.

Hi-Shear rivets are illustrated and technical data given in fourth edition of catalog published by Hi-Shear Rivet Tool Co., 8924 Bellanca Ave., Los Angeles 45, Calif.

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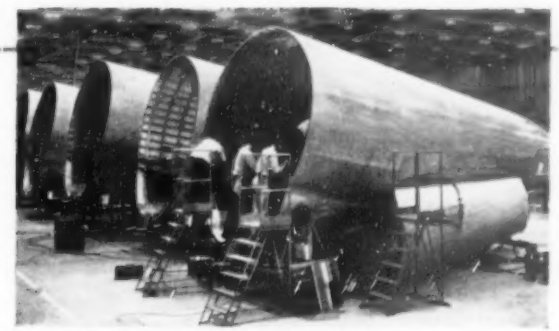
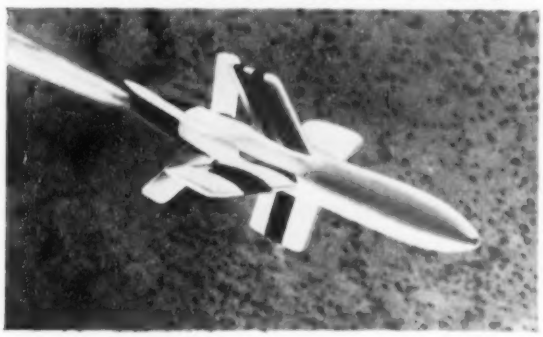


FUSELAGES FOR BOEING C-97

RYAN'S AIR-TO-AIR "FIREBIRD" MISSILE



Thirty years experience in the aviation industry has well prepared Ryan for its present activities—activities that carry into virtually every field of aircraft development and production. From the manufacture of airframe components, huge fuel tanks and executive-liaison airplanes...to electronic research and development...to high-speed pilotless aircraft and jet propulsion research, Ryan activities blanket the aircraft field.

VOLUME PRODUCTION OF AFT FUSELAGE SECTIONS for Boeing's C-97 Stratofreighter is typical of the components manufacturing work carried on for many years by Ryan's Airplane Division. For the C-97, Ryan also turns out refueling pods, cargo doors and floor beams.

THE FIRST RESEARCH MISSILE OF ITS TYPE to be revealed by the Air Force was Ryan's "Firebird" air-to-air guided missile. It has led Ryan into new developments in pilotless aircraft and electronics research. The XQ-2, now flying, is Ryan's new pilotless jet target plane with fighter plane performance.

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ALSO ON THE MARKET

Lower cost for short-run stampings with multiple holes of varying diameters is made possible at its plant, through new labor-saving techniques, says Federal Tool & Mfg. Co., 3640 Alabama Ave., St. Louis Park, Minneapolis 16, Minn.

Angle-Chek protractor, accurate to 5 min., saves time in determining angles on sheet-metal parts produced by hydraulic presses and brakes, says Sheridan-Gray, Inc., 405 Via Chico, Palos Verdes Estates, Calif.

Flag terminals of pure copper and electro-tinned for maximum conductivity are available in eight wire sizes from #8 to #4/0. Aircraft-Marine Products, Inc., Harrisburg, Pa.

Foot switch motor control for a.c. and d.c. equipment is three-pole model with 12 terminals. It operates either with non-return or momentary contact action; is built for rough usage. Aronson Machine Co., Arcade, N. Y.

Rotatable table for positioning work continuously or intermittently at speeds down to ¼ rpm. during seam welding helps speed production, saves operator unnecessary step. All-State Welding Alloys Co., Inc.

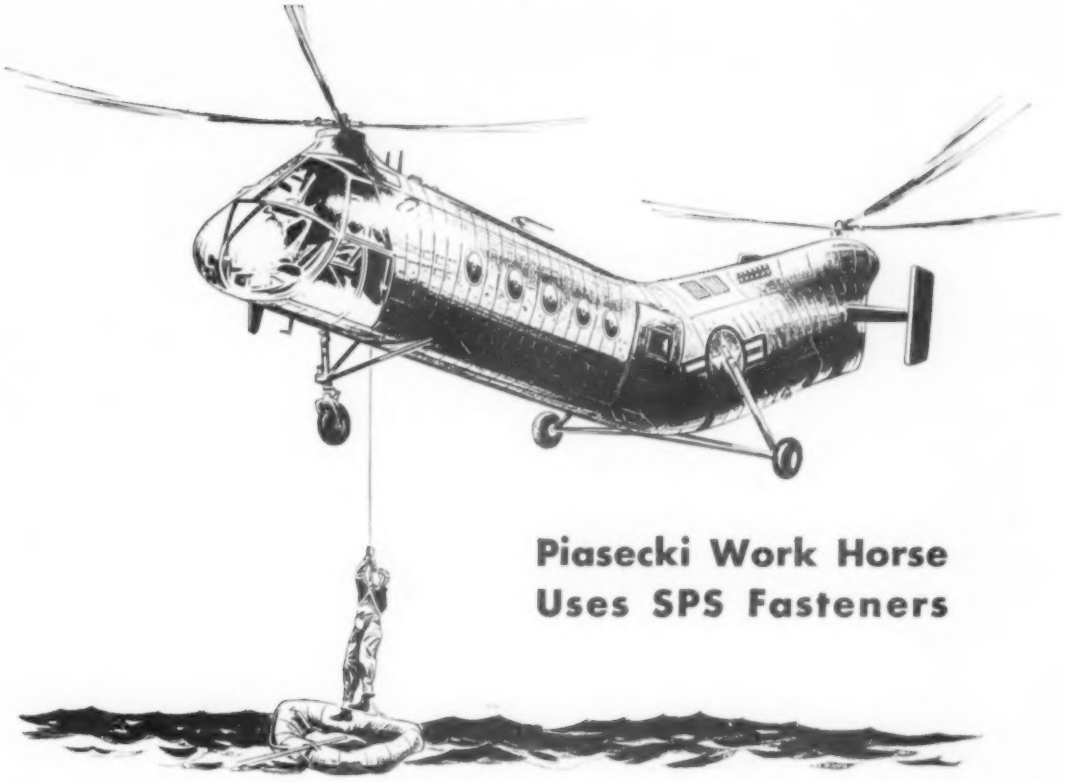
Guillotine suspended from ceiling cuts 2¼-in.-diameter steel rod in 13 sec., can be used for punching and pressing, or riveting 1-in. cold rivets. Manco Mfg. Co., Bradley, Ill.

Standard temperature test chambers (−100 to 200F) have weathering and aging facilities and come in a wide range of sizes for a variety of requirements. Tenney Engineering, Inc., 26 Avenue B, Newark 5, N. J.

Elec-Detec portable noise seeker locates troubles in bearings by visual indication on milliammeter and with audible check on headphones. Detector works on ratchets, cams, pistons and other moving parts. Anco Instrument Div., American Name Plate & Mfg. Co., 4254 W. Arthington St., Chicago 24, Ill.

Milling machine for profiles, irregular shapes, hexagons and geometric forms does the job in only two operations, compared to 11 for some machines. Spike Mfg. Co., 24609 Middlebelt Rd., Farmington, Mich.

Improved drill press for long and short production runs can be operated at speeds of from 720 to 4,325 rpm. for drilling, tapping, reaming, burring and chamfering parts up to 18 in. in height. South Bend Lathe, South Bend 22, Ind.



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Big 4 Route Outlook: More Competition

- **Trunklines square off for fight to get parts of major routes in arguments scheduled for early this spring.**
- **But the number of competing applications will be decided by CAB determination of scope of each case.**

Civil Aeronautics Board prehearing conference on the new Tulsa-Oklahoma City route case brought competitive route applications covering half the U.S., and more requests are expected before the Apr. 3 deadline set by CAB examiner William Madden.

In deciding the scope of this and the two other major route cases set for hearing this spring, CAB faces one of the most important decisions of its career.

All 14 trunk airlines already have filed an estimated 100 competitive route applications in the Tulsa-Oklahoma, Denver service, and New York-Chicago cases. This week will mark closing of applications in the last of these three inter-related cases, and the Board then must decide which to hear.

CAB action in scheduling all three controversial route cases for hearing by this spring was predicted in AVIATION WEEK (Feb. 9, p. 75). Washington observers generally expect the Board to restrict the scope of these cases, as outlined in the AVIATION WEEK story, compromising between narrow case limits sought by the major airlines and the broad scope urged by the smaller carriers. When CAB determines the proportion of each case, they will go to hearing.

More competition is a sure outcome of the three cases. The question is: How much? CAB decision of the scope of each case will be a vital factor in the ultimate answer to that question.

The Board now must decide which of the applications will be considered in each case. The law requires that when CAB considers one new route request, it also must consider all applications for other ways to achieve the same additional service. Those alternate route requests then affect route systems far removed from the original route set down for CAB hearing. Here is how these three cases are shaping up:

• **New York-Chicago case.** The Board is entertaining virtually every application for route extensions and removal of restrictions in the area bounded by New York, Chicago, Buffalo and Pittsburgh.

• **Denver service case.** The Big Three transcontinentals—American Airlines, Trans World Airlines and United Air Lines—seek about all of each other's Chicago-California rights. CAB might try to restrict the case to Denver service, but it vitally affects all three operators and may be broadened for that reason. Eastern Air Lines also has an application in this case.

• **Tulsa-Oklahoma City service case.** At the recently completed prehearing conference, no less than eight trunk airlines filed route applications in this case alone. A ninth carrier, Eastern, "reserved the right" to file some applications. Conceived by CAB originally as a New York-Oklahoma-Texas service case at most, it may involve everything from new transcontinental route request to Capital Airlines' request for consolidation of its heavily restricted New York-Atlanta and "tobacco road" routes.

▶ **Board Problem**—Some CAB members, examiners and staff men want to keep the cases narrowed to the few cities and routes cited in the initial applications that gave each case its priority on the Board's docket.

Other CAB officials want to broaden the issues. They believe this is a big chance for the Board to create a "more balanced route structure." But the only way to do this, other than by merger, is to let regional carriers expand into the longer routes of the Big Four. Question is whether the increased competition would hurt the big lines more than it would help the smaller ones.

▶ **Legal Morass**—The Board, in deciding which route applications to accept, is weighing not only its policy aims but also the legal requirements under the Ashbacker case. In that case, the federal courts ruled that CAB must consider concurrently all route applications basically similar to the application set for hearing. When CAB ruled recently to restrict two major route cases, the courts forced the Board to re-hear them and take into consideration other applications or possible applications affected under the Ashbacker precedent.

The New York-Chicago case has broad geographic limits already set by the Board at its start. Major competitive route applications were detailed by AVIATION WEEK (Feb. 9, p. 75).

But the Denver and Oklahoma cases still have unlimited potential, pending CAB decision of their scope. If Board members deadlock on this, they may await majority ruling by Harmar Denny, the fifth CAB member slated for Senate confirmation.

Here are the major route applications CAB must screen before deciding area limits and competitive scope of the Oklahoma and Denver cases:

▶ **Tulsa-Oklahoma City**—The case arises from TWA's 1946 application to serve Tulsa and Oklahoma City on its transcontinental routes, competitive with American Airlines. At the prehearing conference, TWA asked the Board to limit the case to such service.

Examiner Madden set an Apr. 1 deadline for airlines to file all suggestions for consolidation and Apr. 13 for final replies.

In the other competitive route applications, most airlines claimed the right to consolidation in the case through the chain-reaction effect of the Ashbacker precedent.

• **Braniff Airways** asked consolidation of its application for a Tulsa-New York route extension via Pittsburgh and Washington. This is an example of the chain-reaction principle in these cases. CAB consideration of TWA's basic priority request for New York-Tulsa naturally involves Braniff's request. Braniff also serves Houston and Dallas; therefore, CAB admittance of the Braniff request could involve Delta Air Lines' Atlanta-New York application because Delta serves Dallas-Atlanta and wants extension to New York. These routes affect Eastern and Capital, which in turn affect National.

• **American** asked for Pittsburgh-New York routing on its New York-Cincinnati and South and West route system. Thus, American asked to duplicate TWA's Pittsburgh franchise.

American also asked route extension from Dallas to Houston. This and several other applications for New York-Houston threaten Eastern, just as others threaten AA's New York-Dallas route.

Finally, American asked route extension from Nashville to New Orleans, competing with Eastern and Capital from New York to New Orleans.

• **National** asked a route from New York and Washington to Atlanta and

New Orleans, competitive with EAL and Capital.

National also asked for extension from New Orleans to Houston, competitive with Eastern from New York and intermediate points, and consolidation of its Miami-New Orleans and Miami-New York routes.

• **Northeast** said if a New York-Washington segment becomes involved in the Oklahoma service case, CAB should consolidate the carrier's long-standing New York-Washington application. Northeast further requested that if CAB considered New York-Florida service, the airline also should be heard on this case. Northeast and Delta have a merger application on file, dependent on approval of Atlanta-New York extension, it automatically provides one-stop New York-Miami service.

• **Delta** applied for CAB consolidation of: Atlanta-New York via Charlotte, Washington, and Philadelphia—competitive with Eastern and Capital; and Atlanta-Tulsa via Birmingham and Memphis—competitive with EAL. Together, the two Delta requests amount to duplication of Eastern's Route 5.

• **Capital** asked that CAB lift the restrictions on its present New York-Atlanta and New York-New Orleans route systems, consolidate them and permit New York-Washington service on both. Freeing Capital of its cumbersome setup, with Routes 51 and 55 parallel but separate, would improve the company's service and cut its costs. Capital also asked route extension from Knoxville to Dallas and Ft. Worth via Nashville and Memphis, competitive with American from New York through its southern route to Dallas.

• **Chicago & Southern** told the CAB examiner they assumed the merger with Delta would be approved by stockholders in April, but they put in route applications almost identical with Delta's anyway.

• **United** asked for American's New York-Los Angeles route via Memphis, Dallas, Phoenix and San Diego, and via Tulsa and Oklahoma City.

UAL also sought to compete on TWA's New York-Los Angeles route via Pittsburgh, Dayton, Columbus, St. Louis, Albuquerque and San Diego, plus Dallas.

United asked that these applications be consolidated in the Denver case.

▶ **Denver Service Case**—American, TWA and United in effect asked for three-way competition. It starts from TWA's old application to compete with UAL's Denver service to the West Coast and to the East Coast via St. Louis and Kansas City. TWA also asked Chicago-Denver rights. American has asked to compete with United through Denver and to compete with both TWA and UAL from Chicago to San Francisco and Oakland.

• **Western Airlines** asked for Denver-San Diego via Phoenix in effect asking the Board to give back the route it previously had sold to United. Western also asked Denver-San Francisco via Salt Lake City, competing with United.

• **Eastern** sought a route extension west from St. Louis to Kansas City, affecting TWA, Braniff and others.

• **Braniff** asked Kansas City-Denver extension via three different routes, which would affect United, Western and others.

• **Continental Airlines** put in three bids for route extension to California: Chicago-San Francisco, St. Louis-San Francisco, and St. Louis-Los Angeles. These would compete with all three present transcontinental operators, American, TWA and United.

Pioneer Will Sell Martin 2-0-2s

PAL agrees to reconvert to DC-3s despite its threat to fold following CAB refusal to grant extra subsidy.

Pioneer Air Lines last week told Civil Aeronautics Board it was preparing to sell its Martin 2-0-2s, which CAB has decided not to subsidize, and will reconvert to DC-3s.

Biggest problem Pioneer now faces is how to finance continued losses during conversion to DC-3s. Second major problem is the conversion itself. Meanwhile, the airline has cut back some schedules to conserve dwindling working capital.

Before the decision to go along with CAB, Pioneer president Robert Smith had implied in a letter to stockholders that he might fold the carrier. But CAB indicated it is determined to keep Pioneer in business and would not let the airline go bankrupt during conversion to DC-3s, so long as PAL uses economical means of giving maximum service with minimum subsidy.

Smith, Pioneer's board chairman William Long and attorney Joseph O'Connell apparently decided after meeting with the Board to go along with the CAB decision rather than try to get a reversal.

The Board's decision to keep Pioneer in business gives the carrier a trump card with which to arrange outside financing for the conversion period.

If the company acts fast, it may prevent Central Airlines and Trans-Texas Airways from moving in on some of its routes with temporary CAB exemptions.

▶ **2-0-2 Decision**—Meanwhile, CAB's subsidy ruling caused speculation that airways eventually may hit the same problem as Pioneer. Southwest Airways bought four Martin 2-0-2s to supplement DC-3s on its Los Angeles-San Francisco coastal route system but the carrier so far has not asked higher subsidy for its Martins.

CAB announced two weeks ago it would not give a dime extra subsidy to Pioneer for the Martin operation.

Smith protested in a press release and a letter to stockholders, decrying the Board's "incredible" decision forcing the company to return to giving "second-class service" to its Texas and Oklahoma customers.

The CAB decision granted Pioneer about $1 million a year for DC-3 operation, instead of the approximately $1.5-million Pioneer asked to support its Martin operation.

▶ **Emergency Plea**—All four CAB members remained adamant against the Pioneer petition for reconsideration of their unanimous decision. They also rejected a plea for $846,000 emergency mail pay to tide Pioneer over.

At the meeting with Smith, Long and O'Connell, CAB officials report they received full cooperation from Pioneer.

CAB told Pioneer it wanted the company to reconvert to DC-3s as soon as possible and to maintain all schedules possible during the conversion.

▶ **Outlook**—Following the CAB session, the Pioneer group met with Texas-Oklahoma congressmen rallied by Rep. Frank Wilson. The congressmen and the airline apparently decided not to attempt raising a big political issue in an effort to get the unanimous Board to reverse itself.

Washington observers, however predict a smaller extra subsidy grant, will be requested later to help the company through the reconversion period.

Under the $1,000,500 annual mail rate set by CAB, Pioneer lost nearly $1 million in the 12 months ending Mar. 31. Size of operating losses until completion of reconversion to DC-3s is speculative. It depends on financing and on the lease and purchase market for DC-3s and Martin 2-0-2s. Pioneer a year ago bought nine Martins and sold 12 DC-3s. Now it must reverse the process.

Washington observers speculate that PAL eventually will arrange financing and make the conversion at a total operating loss since last April of not more than $2 million. President Smith was in New York last week seeking more financing from Chase National Bank, which helped finance the Martin purchase. Other backers were a group of Dallas bankers, with whom Smith and Chairman Long also conferred last week.

CAB Policy

- **Ryan warns of excessive airline competition.**
- **Board favors carrier mergers, chairman says.**

Civil Aeronautics Board chairman Oswald Ryan, testifying before the House Interstate and Foreign Commerce Committee, has warned congressmen against pressing for too rapid expansion of competitive airline routes.

Ryan told the committee CAB is intensifying efforts to reduce need for subsidy, and he indicated the Board generally favors carrier mergers and interchange of equipment rather than route extensions to bolster revenues of regional airlines.

▶**Policy Plans**—Because the CAB staff helped Ryan prepare the speech, Washington observers studied his remarks for indications of the Board's new policy plans under a Republican Congress and President.

Some importance was read into the fact that Ryan twice alluded only to Eastern Air Lines in mentioning the case in which both National Airlines and Eastern are fighting for CAB approval of a merger with Colonial Airlines. After mentioning the Braniff-Mid-Continent and imminent Delta-Chicago & Southern merger, Ryan said, "another merger between Eastern Air Lines and Colonial Airlines is already pending before the Board for approval and decision." CAB last year indicated preference for a National-Colonial merger.

Congressman Thomas Pelly and committee chairman Charles Wolverton queried Ryan on CAB's policy of restricting nonscheduled airline operations. They questioned the current policy of revoking registrations if nonskeds fly too often, while CAB only now is holding hearings to decide its future regulatory policy on nonskeds.

Wolverton asked Ryan to produce more information for the committee and return for questioning Mar. 30, the day before CAB is scheduled to appear before the Senate Small Business Committee.

Here are other highlights of Ryan's interpretations of present and future CAB policy and of the Board's record in 15 years under Democratic appointees:

• **Past route authorizations** in some instances "have probably resulted in excess competition which, to an extent, have weakened the particular carriers affected and the overall route pattern." But he added that "certainly the smaller trunklines have benefited from many of the route additions." Summarizing, he said most new routes granted in the past have "strengthened and made more economic the overall route pattern. . . ."

• **New route applications** now pending are so numerous and competitive, he said, that "it is clearly necessary for the Board to proceed cautiously with any further expansion of the route system." Ryan added that "the Board cannot afford to overlook the fact that today's prosperity and high traffic loads are the product of an abnormal, although favorable, cycle in our economy."

• **Aircoach** experiment, conducted during the last few years, "has demonstrated its value to the public," Ryan said.

• **Nonscheduled airlines** have caused "much criticism of the CAB policies . . ." Ryan said. He noted that nonsked "proponents" say the Board should ". . . permit, in effect, regular scheduled service." But "on the other hand, the certificated industry contends that the Civil Aeronautics Act specifically restricted the entry of new carriers into air transportation for the purpose of limiting competition and providing an opportunity for the achievement of sound economic conditions." A minority of the 54 large irregulars "have consistently refused to limit their operations to services of an irregular and infrequent type," Ryan said, "and this small group has presented the Board with a serious enforcement problem." He added that military contracts not subject to CAB's restrictions on business volume now account for 30% to 40% of nonskeds' total revenue.

• **Local service lines** still are in an experimental stage, Ryan said. "We have made it clear . . . that they must show continued progress towards self-sufficiency if they are to survive." He estimated local service subsidies at $16.7 million in 1951, $19.5 million in 1952 and $22.5 million in 1954. From 1951 to 1952, their passenger-miles increased from 240 million to 310 million. Thus government subsidy to the local airline rider declined from 7 cents a mile or $7 a 100-mile trip to 6.3 cents a mile or $6.30 per 100-mile trip in one year.

• **International airline** operations of U. S. carriers are faced with the threat of increasing foreign restrictions and competition, Ryan said. United States share of North Atlantic traffic, now served by 11 airlines, including two U. S., dropped from 71% in 1947 to 52% last year. But total U. S. Atlantic traffic increased 50%. The United States will be able to maintain a favorable competitive position in this market because of emphasis on aircoach, he concluded. U. S. subsidy to flag carriers will be $44.2 million this year and $44.8 million next year, he estimated.

• **Air safety regulation**, Ryan said, "is perhaps the most difficult task which confronts us," because accident prevention depends on so many small details beyond direct control. It is like Benjamin Franklin's story of "the loss of a kingdom for want of a nail," Ryan said. Illustrating this, Ryan told the congressmen how, in a recent airplane overhaul and modification of the control system, a mechanic failed to insert a cotter key locking a nut on a bolt. "A few days later the nut vibrated off the end of the bolt; the bolt came out of the hole; the pilot found himself with no control over the elevators of his plane, and a fatal crash occurred." CAB safety regulation cannot prevent every such chance, Ryan pointed out. The Board sets standards of training, flying procedure and aircraft quality, adjudicates violations of the resultant regulations, investigates accident causes, and improves its regulations. Since 1938, Ryan said, CAB has investigated the cause of 722 crashes and "solved" all but 26, or 3½% of the cases.

SABENA'S FIRST DC-6B

Here is the first of eight DC-6Bs ordered by Sabena Belgian Airlines prior to its delivery flight to Stockholm. This plane flew from New York to the Swedish capital (4,000 mi.) in 12 hr. 36 min. nonstop. Sabena's DC-6Bs will have 77 reclining seats and will be used on tourist service exclusively initially. A crew of seven will include two cabin attendants. Engines are P&WA R2800-CB17s and props are Model 43E60 Hamilton Standards.

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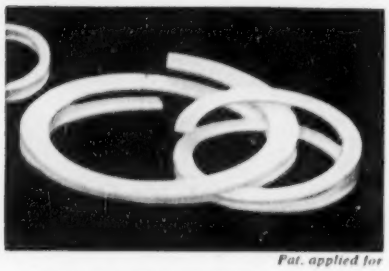

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Air Facilities Buildup Planned in S. Pacific

(McGraw-Hill World News)

Melbourne, Australia—Construction of a weather forecasting network and reorganization of aviation communications in Southeast Asia and the South Pacific preparatory to the start of jet liner traffic was recommended this month by representatives of 14 nations in the area and observers from several of the international aeronautical organizations.

Installation of high-intensity approach lighting systems at nine airports in the region also was recommended at the meeting, organized by the Far East and Pacific Offices of the International Civil Aviation Organization.

In addition, delegates proposed adoption of ICAO's standardized altimeter setting procedures in the southern portion of the Pacific region.

▶ **Special Techniques**—Weather network recommendations proposed creation of 530 meteorological observation posts for frequent surface weather reporting and a number of stations for upper air observations.

The conference found that at least 34 weather forecasting stations and a large number of smaller points will be necessary for the area where future jet transport traffic will mean a large-scale development of necessary meteorological services.

An attempt will be made to develop special techniques for forecasting upper air winds and weather in tropical and semi-tropical areas, delegates said.

▶ **Aeromobile Emphisis**—In aeronautical communications, the area would be reorganized and aeromobile services emphasized with increased use of radiotelephony.

New flight information regions have been recommended for Cocos Islands, Taiwan and Biak. Some adjustments of importance have been arranged for other regions.

Idlewild Facilities

Port of New York Authority has signed 20-year leases with United Air Lines and Greer Hydraulics covering new facilities to be erected for the companies at New York International Airport (Idlewild).

The United Air Lines hangar, and related facilities will cost approximately $3 million. It will be erected on a 43-acre site on the field and will measure 850 ft. wide by 175 ft. deep. It is to be of suspended cantilever design. Rental for the building, land and related services will be approximately $360,000.

Greer Hydraulics, Inc., Brooklyn, N. Y., aircraft test equipment manufacturer, will get a one-story 155,000-sq. ft. structure to cost some $1.3 million at rental of approximately $155,000 annually. It will house research, development and manufacturing activities.

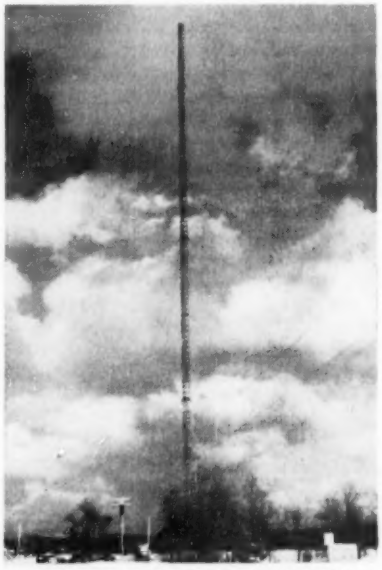
Bush Airline Begins Scheduled Service

Vancouver—Queen Charlotte Airlines is beginning operations as a scheduled carrier on the British Columbia coast, abandoning bush flight service in western Canada.

Charter and nonscheduled feeder services formerly flown by Queen Charlotte to coastal points are being taken over by the British Columbia Airlines, which plans to use the de Havilland-Canada Beaver floatplane as its standard aircraft.

Queen Charlotte is scrapping its fleet of Noorduyn Norseman monoplanes and Vickers Stranraer biplanes, replacing them with DC-3s, Canada-built PBY amphibians and Avro Ansons.

In Ottawa, it was reported the airline will be granted a federal subsidy to operate scheduled airline services along the coast.



1,218-FT. RADIO TOWER

This radio tower is used in special research and development projects by USAF at Rome Air Development Center near Forestport, N. Y., to beam experimental radio waves over long distances. The 1,218-ft. structure ranks only second in height to New York City's famed Empire State Building's height of 1,450 ft., including TV antenna. The tower and its supporting cables press down a weight of 2,280,077 lb. upon a single pivot casting mounted on three porcelain insulators.

EAL's 1952 Profit Tops $8.5 Million

Eastern Air Lines' net profit for 1952 hit a record $8,513,618 on operating revenues of $118,553,076 plus a $1.25-million net profit on sale of 32 DC-3s.

Revenues and costs both gained about 30% of the $24.5-million increase in operating expenses. Depreciation charges on new equipment accounted for $7 million of that rise.

President E. V. Rickenbacker says, "The outlook for the current year appears good." Passenger traffic during the early months of 1953 gained 40% from a year ago and passenger revenue gained 30%. Higher proportion of aircoach fares caused the lower revenue yield on the traffic volume, Rickenbacker says, adding that "the future growth of airline traffic will be closely associated with . . . aircoach traffic."

► **New Boston Coach**—Eastern announced a new Boston coach service to the South and Southwest. Eastern has for some years been the largest aircoach operator in the world, Rickenbacker says. The company will keep expanding its coach service to meet demand.

United Air Lines also recently announced a Boston transcontinental coach. Eastern's proposed fares, effective Apr. 26: Atlanta $38.90, Birmingham $44.30, Jacksonville $41.80.

Eastern's proposed Boston coach fares include $51.40 to Miami and $70.50 to Houston.

► **Earnings**—Eastern's 1952 net profit topped the $7,231,621 of a year ago by over $1 million and gross revenues gained $20 million or 21%. Passenger revenues accounted for nearly 95% of Eastern revenues.

Despite the $7-million increase in depreciation charges and high fleet integration costs, the company's unit costs dropped because of increased efficiency of newer planes, Eastern reports. Operating cost per sea-mile decreased from 3.0 cents to 2.94 cents.

Federal income tax was $9.3 million plus $14.5 million transportation revenue taxes and $2 million federal and state gas and oil taxes, making nearly $26 million in direct taxes—three times the company's net earnings and almost one-fourth the company's total revenues.

► **New Planes**—Eastern now has received the last of its 60 Martin 4-0-4s and deliveries start on 16 Wright Compound-engine Super Constellations this fall. The new planes and spare parts will require further capital expenditure of about $25 million, compared with capital expenditure of $36 million in 1952, including balance of $10.5 million for 10 Super Constellations and $17.5 million for 48 Martins delivered in 1952.

SHORTLINES

► **Alaska Airlines** has started air express service Portland-Seattle to 74 Alaska points under contract with Railway Express Agency.

► **American Airlines** asks CAB for new route authorizations: nonstop Cincinnati; extend Route 4 from Nashville to Houston via New Orleans and from Nashville to Houston direct; and nonstop Dallas-Houston.

► **Avianca**, Colombian national airline, has a two-year $1-million contract for maintenance and overhaul service by Lockheed Aircraft Service on overseas Constellation operation. . . . Company starts weekly service to Bermuda on Apr. 3 on European flights.

► **Bonanza Air Lines** February load factor was 50% of capacity. Passenger volume equalled January, which was an all-time high for the company.

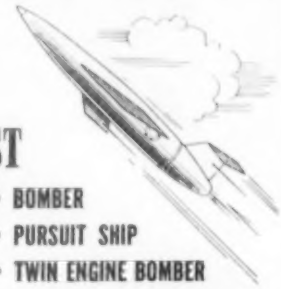
► **Eastern Air Lines** hearing by CAB on the Super Constellation runway accident at Midway Airport, Chicago, was slated for Mar. 19 in Chicago. Landing gear folded toward the end of the landing roll on Mar. 3.

► **Flying Tiger Line** leased a C-54 from Trans Caribbean Airways for two years, making a total Tiger fleet of 11 four-engine and 26 twin-engine planes.

► **International Civil Aviation Organization** reports an American weather ship will replace a Dutch ship on the North Atlantic while the Dutch vessel stands by in the North Sea reporting close-in weather developments during the Netherlands dike rebuilding program. ICAO sponsors the 10-station, 25-ship Atlantic weather and rescue service.

► **Los Angeles Airways** has a CAB show-cause order proposing new temporary mail rate of $2.47 a plane-mile on base mileage up to 33,000 mi. and $1.075 above that. CAB forecasts break-even need for $212,972, or $1.96 a mile Dec. 1, 1952, to Mar. 31, 1953, and annual need of $685,260, or $2.10 a mile thereafter, with expanded Sikorsky S-55 operation. Rate for Apr. 11 to Nov. 30, 1952, the CAB order proposes $314,372, or $1.99 a mile.

► **National Airlines** revenue passenger-miles in February gained 39% from a year ago. January and February topped National's previous all-time high of March a year ago by 10% and 12% respectively.



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66	10078-1AG	Eclipse	Gyro Indicator
62	CQ-9	Eclipse	Clutch Switch (PB10)
11	12086-1C	Eclipse	Amplifier
19	15100-1B-A1	Eclipse	Pitch Trim Gauge
8	20000-43A-13A1	Eclipse	Magnesyn Indicator
67	23000-2A	Eclipse	Magnesyn Indicator
15	22101-11-A4	Eclipse	Pressure Trans.
6	2226-11C-3A	Eclipse	Dual Tach.
9	20100-42B-14A2	Eclipse	Torque Ind.
9	20000-8A-14	Eclipse	Magnesyn Pos. Ind.
23	20100-11C-4-A1	Eclipse	Wing Flap Indicator
11	DW-33	Eclipse	Transformer
23	CQ-2	Eclipse	Switch Box
75	1195-4-A	Eclipse	Vibrator
80	DW-28	Eclipse	Transformer
11	2227-11-D3A	Eclipse	Tachometer
75	1416-12E	Eclipse	Starter
100	716-3A	Eclipse	Generator (NEA-3A)
384	564-2A	Eclipse	Oil Separator
71	828TY13Z2	Weston	Oil Temp. Indicator
40	119862	Weston	Carb. Air Temp. Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
1000	AN5780-2	G.E.	Wheel & Flap Position Indicator
40	828TY12Z2	Weston	Dual Carb. Temp. Gauge
11	727TY70Z2	Weston	Air Temp. Ind.
85	727TY72Z2	Weston	Air Temp. Gauge
88	727TY73Z2	Weston	Air Temp. Gauge
83	727TY74Z2	Weston	Air Temp. Gauge
10	728-40Z2	Weston	Air Temp. Gauge
21	8DJ29AAY	G.E.	Cowl Flap Ind.
22	77C5	Lewis	Carb. Air Temp.
16	76B19	Lewis	Cyl. Head Temp.
23	77C3	Lewis	Oil Temp. Gauge
13	77C4	Lewis	Oil Temp. Ind.
30	47B21	Lewis	Free Air Temp.
33	47B22	Lewis	Air Temp. Gauge
28	47B23	Lewis	Air Temp. Gauge
54	47B24	Lewis	Air Temp. Gauge
22	906-6-011	Kollsman	Diff. Press. Gauge
48	2548K-6-052	Kollsman	Diff. Press. Gauge
33	DW-47	Eclipse	Transformer
46	117-47	Edison	Fire Detector
19	117-10	Edison	Control Box
345	981280	Kidde	CO2 Cylinders
43	966090	Kidde	Interconnector
104	966679	Kidde	Pressure Control
225	981591	Kidde	Tee
151	A-4614	Kidde	Switch
47	M870036B	Kidde	CO2 Cyl.
74	923748	Kidde	Oxygen Cyl.
326	982585	Kidde	Valve
325	AN60009-1B	Oh. Chem.	Valve
247	AN6009-2A	Oh. Chem.	Valve
47	2-1046-76	Parker	Valve (3000 PSI)
115	P4CA2A	Parker	Primer
68	SP4-2746-77	Parker	Restrictor Valve
105	SP4-2746-78	Parker	Restrictor Valve
68	6-746-10	Parker	Valve
40	SP4-2746-79	Parker	Restrictor Valve
48	SP-2746-80	Parker	Restrictor Valve
60	SP4-2746-81	Parker	Restrictor Valve
127	PL2-2546-75	Parker	ConeCheckValve
123	PI2-2546-76	Parker	ConeCheckValve
620	PL2-2546-77	Parker	ConeCheckValve
540	PL2-2546-78	Parker	ConeCheckValve
142	SP4-2746-76	Parker	Restrictor Valve
112	PLY-843-54	Parker	Check Valve
123	PL2-1846-77	Parker	Check Valve
120	MF9-713-15A	Vickers	Hydraulic Pump
124	PF12-713-25BCE	Vickers	Hydraulic Pump
10	PF9-2713-20Z2	Vickers	Hydraulic Pump
327	PF4-713-20BCE	Vickers	Hydraulic Pump
57	MF45-3911-20Z	Vickers	Hydraulic Pump (3000 PSI)
28	AA31400	Vickers	Valve
125	D7818	Adel	Anti-icer Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
45	AN4103-2	Clifford	Brass (Valve #U4785) Oil Cooler
70	AN3213-1	Scintilla	Ignition Switch
250	A-9 (94-3226)	Nesco	Ignition Switch
66	M862A	Jos. Pollack	Master Switch
148	PG208AS1	Honeywell	Switch Air Ram.
40	PG208AS7	Honeywell	Air Ram Switch
18	4582-AA-6C	Dynamic Air Eng.	Blower
24	U-709-15	Joy Mfg. Co.	Blower
20	V301B7	Aerotec	Pressure Relief Valve
419	450	Skinner	Filter
287	1033-4E1	White-Rodgers	Heater Control Switch
126	17322-2	Fenwall	Thermo-Switch
34	9804B	Vapor Car Heating Co.	Control Box
25	46B311	Vapor Car Heating Co.	Compensator
202	A812	Interstate Aircraft & Eng. Co.	Solenoid
46	146102	Bendix	Valve (0-500 PSI)
240	1265-900	Airex	Relief Valve
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8	HC2110	Air Associates	Hyd. Cylinder
53	AN6203-3	Bendix	Accumulator 10"-1500 P.S.I.
90	JH950-R	Jack & Heinz	Starter Motor
140	K14949E	Marquette	Windshield Wiper Kit
188	EYLC-2334	Barber-Coleman	Control
230	921-B	Stewart-Warner	Heater (200000 BTU)
22	0655-D	Aro	Oxygen Regulator
65	ASDC2	CO2 Mfg. Co.	Fire Detector
97	6041-H-146A	Cutler Hammer	Relay (B-12)
237	6141-H69A	Cutler Hammer	Circuit Breaker
47	7264-404	Leach	Relay
22	M-9031	Air Associates	Actuator
11	FYLD2516	Barber Colman	Thermostat
51	AYLZ2284	Barber Colman	Micropositioner
20	72400	Ham. Stand.	Prop. Reversing Control
10	5X18	Woodward	Governor
46	A14-A-9708P	Westinghouse	Contactor
26	70G3	G.E.	Transformer
718	B9A	Square D	Relay
6	83A94	Surface Combustion Co.	Heater
115	C6363-1-5A	Spencer	Circuit Breaker
115	C6363-1-2A	Spencer	Circuit Breaker
33	18784	Adel	Restrictor Valve
1700	AM1614-80	Heinemann	Circuit Breaker
31	BO8X-2	Allied	Relay
85	19924-2	Adel	Lock Valve
805	58G926	G.E.	Ballast Core & Coil
140	58G946	G.E.	Ballast
40	7210-24	Leach	Relay
66	25432	Airesearch	Flex. Cable
518	MT48C	Bendix Radio	Insulator
20	M-101-B	Aerotec	Pressure Switch
12	MT68EG	Bendix Radio	Mount
52	715E	Fulton Syphon	Temp. Control
478	D9530	Adel	Selector Valve
668	D9530-2	Adel	Selector Valve
428	D9560-2	Adel	Selector Valve
179	D9632	Adel	Selector Valve
237	D9696	Adel	Selector Valve
744	D10044	Adel	Selector Valve
244	D10051	Adel	Selector Valve
814	74247 (TY, PH3)	Aero Supply	Valve
335	AN5830-1	Whittaker	Valve
74	AN5830-6	Whittaker	Valve
60	AN5831-1	Parker	Valve
65	1011-2	Eclipse	De-Icer Valve
130	612-4A	Eclipse	Valve
2200	37D6210 (AN4078-1)	United	Solenoid Valve
1888	K1593-6D	Kohler	Valve
500	NF3-5	Mallory	Noise Filter
20	TA-12B	Bendix Radio	Transmitter
35	RA10-DB	Bendix Radio	Receiver
2585	AN3096-4	Grimes	Dome Light
775	AN3096-5	Grimes	Dome Light
1365	AN3096-6	Grimes	Dome Light
6	610-2C	Eclipse	Vacuum Pump
550	PD12K10	Stromberg	Carburetor
236	PR48-A1	Stromberg	Carburetor
90	1685-HAR	Holley	Carburetor
19	1375F	Holley	Carburetor
407	SF9-LN-2	Scintilla	Magneto
185000	LS4-AD1	Aero	Spark Plug
1	R1820-52	Wright	Engine
16	R1820-54	Wright	Engine
4	R1820-60	Wright	Engine
1	R1830-43	P & W	Engine
166	1045A	P & W	Bearing
500	3506	P & W	Flange
130	8288	P & W	Follower Ass'y.
814	35814	P & W	Blower Ass'y.
53	48362	P & W	Shaft
75	48363	P & W	Shaft
56	48392	P & W	Sump
390	48461	P & W	Gear
78	76236	P & W	Gear
1178	84289	P & W	Bearing
113	84487	P & W	Housing
77	84591C	P & W	Nose Housing
200	84350-D	P & W	Crankcase Ass'y.
200	84083	P & W	Cylinder
100	84084	P & W	Cylinder
200	84085	P & W	Cylinder
281	CR2791-G100-K4	G.E.	Relay
626	CR2792F101-A3	G.E.	Relay
41	G34464	Guardian	Relay
350	G31502-A	Guardian	Relay
22	146102	Vickers	Brake Valve
9	557-5	Eclipse	Check Valve
6	TFD-6500	Thompson	Pump
107	D12296	Adel	Pump
67	19100-2-101B	Kenyon	Check Valve
88	3135-11C	Eclipse	Pressure Switch
32	3V-217-HC	Pesco	Separator
100	27314	Purolator	Oil Filter
128	3801-3B	Eclipse	Fuel Quan. Gauge
33	420313	Wright Aero	Pump Assy.
46	416421	Wright Aero	Drive Assy.
76	U635A (AN4000-2B)	U.A.P.	Fuel Strainer
12	U8416-MM	U.A.P.	Oil Cooler Assy.
25	26675	Airesearch	Motor
35	AA14002A	Vickers	Accumulato
21	FD65-5	Diehl	Motor
81	3616	Bendix Radio	Control
23	3620	Bendix Radio	Station Box
17	C-8(B-2930-A)	Grimes	Cockpit Light
335	G1 (94-32376)	G.E.	Oxygen Pressure Signal Assy.
180	AW-CV-1-1	U. S. Gauge	Check Valve
740	1C-200	G.E.	Radio Noise Filter
15	1EAR-280BH	Pesco	Pump
7	SP-1-445-8	Parker	Selector Valve
8	1E621	Pesco	Pump
29	NEP-2	Eclipse	Auxiliary Power Unit
16	LER-30D	Lawrence	Auxiliary Power Unit
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6	2P248EB	Pesco	Fuel Pump
21	2E258SA	Pesco	Pump
146	AW2-3/4-25K	U. S. Gauge	Manifold Press Gauge (Metric)
27363	CREB3N	Casco	Rod End
18	SA/3A	Kidde	Impact Switch
13	3GBD1A18A	G.E.	Regulator
18273	AN200-K3L2	Fafnir	Bearing
245	LMR-4	Micro	Switch
2094	PM-5	Spencer	Circuit Breaker
44	5BA25D-J4B	G.E.	Motor
31	5AM31JJ9A	G.E.	Amplidyne
111	5AM31NJ10	G.E.	Amplidyne
425	5BA40NJ1A	G.E.	Motor
189	5PD65-MB1	G.E.	Motor
25790	NR6L12	Torrington	Bearing
26	MS49A	Bendix Radio	Antenna Switch
45	D8060	C. P. Clare	Relay
298	727-TY37P	Weston	Air Temp. Ind.
2000	8909-K99	C. H.	Switch
2747	NAF310310-4B	Cannon	Plug
402	NAF310310-5B	Cannon	Plug
132	AN6209-8	Hydro Aire	Valve
50	AN6213-2	Bendix	Hyd. Valve
280	AN6220-4	Aeroquip	Coupling
27	AN6247-2	Adel	Hyd. Valve
14	UA8013-MM	United Aircraft Prod.	Oil Cooler
1175	RS-2	Mallory	Selector Box
172	A7012	Delco	Motor
6	8DJ13ABK	G.E.	Tachometer Indicator
200	2222-1F-2A	Eclipse	Tachometer Indicator
28	AN5770-2	Manning Maxwell Moore	Manifold Pressure Gauge
71	1003-4	Eclipse	Generator
427	NAF1016-1	Adams & Westlake	Light Ass'y.
616	NAF1016-2	Adams & Westlake	Light Ass'y.
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LETTERS

Training Executives

A note of appreciation for the editorial ("The Executive Bottleneck") Mar. 9. Augie Esenwein at Fort Worth and Sandy Coggan at our San Diego Division have, for some time, been fully exercising the executive training program you comment upon. San Diego, in fact, is now on its second go-around of rotation of key men, in order to acquaint all concerned with each other's responsibilities and problems; and also to give us more than one string to our bow in each of these areas.

Without doubt such a program will pay off in the long run in terms of more useful executives in greater numbers. It is already paying off in terms of the interest it arouses on the part of the people concerned; all see in the actuation of the program an immediate company interest in the advancement of their individual careers.

Thanks again for your commentary; as well as for the continuingly excellent reporting job your book does on the aviation industry, and from Convair's point of view, our part in it.

T. G. Lanphier, Jr., Vice President
Consolidated Vultee Aircraft Corp.
San Diego 12, Calif.

Dope on Red Aviation

I have seen your editorial, "Hot News About Russian Aviation" . . . if we had more people who wanted to report the truth in this country, like yourself, and less propaganda, which has seemed to be the general fad in Washington and everywhere else the past twenty years, I believe we could get down on a solid basis. If they think they are going to scare the American people into doing something, they are crazy because the people are a little smarter than that. But if they are told the truth, they will perform accordingly . . .

Roscoe Turner
Roscoe Turner Aeronautical Corp.
Weir Cook Municipal Airport
Indianapolis 44, Indiana

Marconi VOR

For the sake of the record, we should like you to correct the statement which appeared on page 48 of your Feb. 23 issue relative to the Marconi VOR project.

In fact, we merely asked the Civil Aeronautics Administration to evaluate the VOR station we have designed and are manufacturing as a company-sponsored project.

Officers attached to the CAA London Office, together with the USAF authorities in England, gave us wholehearted co-operation which enabled us to establish that our equipment meets in all respects the international requirements for this type of navigational aid.

We should like to take this opportunity of publicly acknowledging the keen interest shown by the CAA in our project, and to record our lively appreciation of this further example of US/UK collaboration in a sphere of mutual interest.

In conclusion, we should like to say how much we enjoy your informative and stimulating journal.

L. A. Sweny, Manager
Aeronautical Division
Marconi's Wireless Telegraph Co., Ltd.
Marconi House, Strand
London, W. C. 2, England

A.W.'s Fellowship

. . . I want to express appreciation on behalf of the Graduate School for your continued support of the Aviation Week Fellowship in Aeronautical Engineering for the academic year 1953-54. Also I should like to tell you about the present holder of this Fellowship.

Mr. Robert Harper, Jr., is this year's Aviation Week Fellow. He is one of the Honors Group students in Aeronautical Engineering who should receive the Bachelor's and Master's degrees simultaneously this June. His record on graduate work so far is 5.00 on our scale of 5.00 for the equivalent of almost two terms of graduate work. Professor Ober, who knows Harper fairly well personally, says that this record represents well the kind of man he is intellectually.

You are entitled to justifiable pride in your contribution to advanced education in Aeronautical Engineering when your Fellowship can be used to encourage and support a man such as Harper.

Harold L. Hazen, Dean
Massachusetts Institute of Technology
Cambridge 39, Mass.

Prone Flight

Your article entitled "Will Prone Flight Lick High G Loads?" in the Dec. 29 issue of Aviation Week included an inaccurate statement, namely that the prone pilot control column built for the Aero Med Lab at Wright Field by Tison Brothers of Los Angeles was designed by Hans Amtmann.

Mr. Carlton G. Peterson, now president of the Stephen-Douglas Co., Inc. of Santa Monica, Cal., was chief engineer of Tison Brothers during these prone pilot control projects, and was the designer of the particular unit mentioned in your article.

Credit for the specifications for positions, travels and the movable arm rest feature can be given to Mr. Amtmann. However, the design and development of the physical unit was part of the contractual obligation of Tison Brothers, who had designed and built experimental prone pilot control columns for Wright Field Aero Med flight tests as early as 1945.

Kingdon Kerr
Director of Public Relations
Stephen-Douglas Co., Inc.
P. O. Box 13472
West Los Angeles 25, Cal.

AVIATION CALENDAR

Mar. 31-Apr. 2—First International Magnesium Exposition, National Guard Armory, Washington, D. C.

Mar. 31-Apr. 2—Safety meeting Air Line Pilots Assn., Sherry Hotel, Chicago.

Apr. 15-16—First annual engineering management conference, Management Division of The American Society of Mechanical Engineers, Rackham Bldg., Detroit.

Apr. 20-23—Aeronautic Production Forum, National Aeronautic Meeting and Aircraft Engineering display (SAE), Hotel Governor Clinton and Hotel Statler, New York.

Apr. 20-May 2—Annual Conference of Technical Committee, International Air Transport Assn., Caribe Hilton Hotel, San Juan, Puerto Rico. Helicopter Symposium will be a principal feature.

Apr. 21-24—SAE Committee A-6, Aircraft Hydraulic and Pneumatic Equipment meeting, Governor Clinton Hotel, New York, N. Y.

Apr. 25-May 2—First annual National Transcontinental Handicap Air Cruise for private planes of 300 hp. or less, Philadelphia to Palm Springs, Calif., sponsored by Philadelphia Junior Chamber of Commerce.

Apr. 29-May 1—1953 Electronics Components Symposium (AIEE-IRE), Shakespeare Club, Pasadena, Calif.

May 6-7—Second annual Skylady Derby, sponsored by Women's National Aeronautical Assn., sanctioned by NAA and conducted under FAI rules. From Fort Smith, Ark., to Memphis, St. Louis, Kansas City and return to Fort Smith. WNAA's twenty-fourth annual convention will follow at Fort Smith.

May 11-13—National Conference on Airborne Electronics, Dayton Biltmore Hotel, Dayton, O.

May 14-16—American Helicopter Society Forum, Mayflower Hotel, Washington, D. C.

May 16—Armed Forces Day, open house programs at local USAF, Navy, Army, Marine and Coast Guard installations.

May 18-22—Fifth National Materials Handling Exposition, Convention Hall, Philadelphia.

May 18-22—Aviation Seminar, National Fire Protection Assn. annual meeting, Palmer House, Chicago.

May 19-22—Annual convention Aviation Writers Assn., Ft. Worth, Tex.

June 11-13—Fifth annual All-Women International Air Race, Welland, Ont., to New Smyrna Beach, Fla., sponsored by Ninety-Nines, Inc.

June 17-19—Mid-year meeting of Aviation Distributors and Manufacturers Assn., Chateau Lake Louise, Alberta, Canada.

July 27-Aug. 2—1953 Model Airplane Championships, U. S. Naval Air Station, Willow Grove, Pa.

Sept. 7-13—1953 SBAC Coronation Year Flying Display, Farnborough, Hampshire, England.

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EDITORIAL

A Blow to Local Service Lines

Financial observers say that investor confidence in local service airlines has been severely impaired by Civil Aeronautics Board's decision not to support Pioneer Air Lines' operation of Martin 2-0-2s, replacing DC-3s.

According to Selig Altschul, AVIATION WEEK's financial analyst, it appears doubtful if any public financing of the so-called "feeder" airlines on a reasonable basis will now be possible, as a result of this Board decision. "Nor are the consequences likely to be confined to Pioneer and the local service group," he believes. "Serious repercussions may spill over to affect trunk airlines, as well as plans of aircraft manufacturers."

Even before the Board's decision on Pioneer, public financing of local service airlines had been extremely difficult. Out of 18 feeders created over the past 10 years —while almost all tried—only six were able to secure public financing, and they paid rather high prices. "Moreover," Mr. Altschul says, "with but one exception, all such common stock flotations have been and are now selling at material discounts to their offering prices."

Obviously, an important drawback to investment in feeders is their heavy dependence on mail subsidy. It is felt in the financial district and some airline circles that the Pioneer switch from DC-3s to Martin 2-0-2s represented the first significant hope of a feeder generating sufficient traffic to eliminate subsidy eventually. This prospect was torpedoed by the CAB and all local service carriers now are consigned to continuing heavily subsidized DC-3 operations.

Past decisions of the Board have established ample precedents for a carrier to assume the initiative in acquiring postwar equipment where traffic has dictated, with the expectation that additional mail pay would be forthcoming.

There is a strong feeling in industry that the Board is now substituting judgment of its own, clearly of a managerial nature, in place of that of the carrier. Nor is the language used by CAB in this decision, in attempting to justify its action, likely to inspire investor confidence in the feeders, nor in the rest of the industry, for that matter.

Mr. Trippe Is No Ostrich

A lot of U. S. aviation people are hiding their heads in the sand to keep those approaching jet airliners out of their eyes.

Juan Trippe, president of Pan American Airways, is not one of them.

No one on this side of the Atlantic has radiated the convincing optimism on the subject that appeared in the recent address of one of Mr. Trippe's executives, John Borger, chief project engineer for Pan American.

Pan American believes in the jet transport, despite the headaches and problems it will bring. It backs up belief with the only firm order for jet planes that any U. S. flag airline has placed so far. The fact that the planes ordered are British-designed and -built underscores Mr. Trippe's courage.

Mr. Borger's address (AVIATION WEEK Mar. 16) takes due note that the jet airliner, like other significant changes of the past, has been accompanied by jeers.

"But we can no longer speak of the jet transport as something to come in the future," he says. "It is here now, and here to stay."

Sure 'tis true—the jets flying today are uneconomic, too small, too short range, unproven operationally, etc.

"They present a wholly new set of problems which must be solved before full-scale commercial operations can be undertaken," Mr. Borger concedes.

But the piston engine has about reached its peak. Until atomic power arrives, the future belongs to the gas turbine. How can we afford not to learn everything we can about the jet?

In one jump, the Comet 1—undeserving of some low snarls from America—has accomplished two-thirds the speed increase that the entire industry has accomplished in 25 years, Mr. Borger reminds us. "While other transports are cruising at or slightly over 300 miles an hour, the Mark 1 is doing 450, and Comets 2 and 3 will do close to 500.

"Since the primary product of air transportation is speed, the jet transport provides the airline operator with a new tool capable of greater production . . ." Mr. Borger says.

During those coming hours of jet trial and tribulation, let's never forget about the past heartaches. Since World War II, five basically new types of transport have been introduced in the U. S. "Before these became successful, three had to be grounded and the other two came very close. These airplanes, either in the original or in later version, have become successful because of prompt corrections applied as result of this experience."

It is also worth noting, with a shudder, that by the time any American operator flies a jet transport in regular service, Mr. Borger says, "BOAC should have more than four years' operating experience with Comets 1 and 2. Other operators around the world, some of them U. S. competitors, will also have valuable experience in Comets."

Yes, the only way to tackle this "wholly new set of problems" the jet presents is to fly it. Certainly, if the advanced jet transport is going to cost so much, we had better be sure we know how to operate it when it finally comes. Not getting full utilization out of an airplane—or not knowing how to fly it with maximum safety—can be extremely costly, with ships price-tagged at a couple of million dollars or more apiece.

What better way to learn than with a suitable, cheaper airplane, such as the Comet 1? Mr. Borger asks, no doubt aiming a shaft at some of his U. S. airline contemporaries who talk of operating full-size jet airliners from the start.

Despite all of the problems of the jet airliner, present and future, Pan American's spokesman says, "We know there are solutions to them all. Our customers of the future will not be interested in the problems, only the solutions. If we of U. S. aviation do not offer the solutions, it is to be expected that others will."

Mr. Trippe and company are not trying to hide from jets—not even the lowly British jets.

—Robert H. Wood

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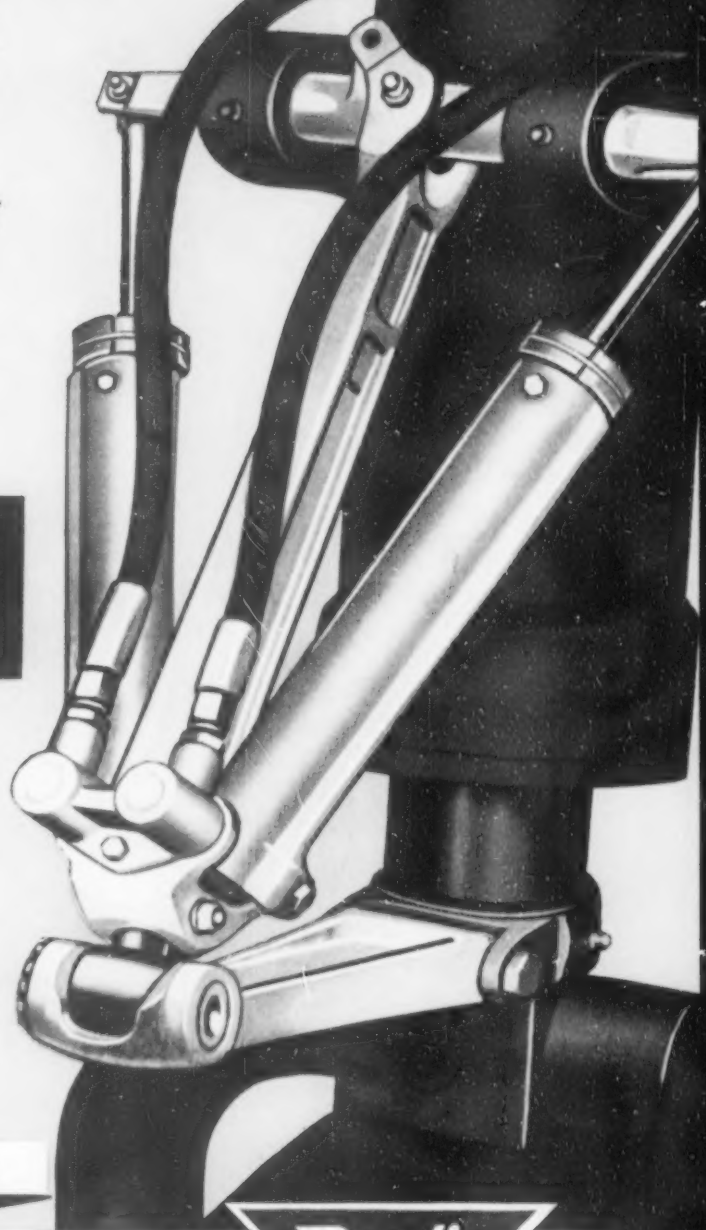

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Although Bendix Torque Link Steering is a new conception of more efficient steering action it has been fully tested and proved. After exhaustive laboratory tests it is now being used on several of the newer planes with excellent results.

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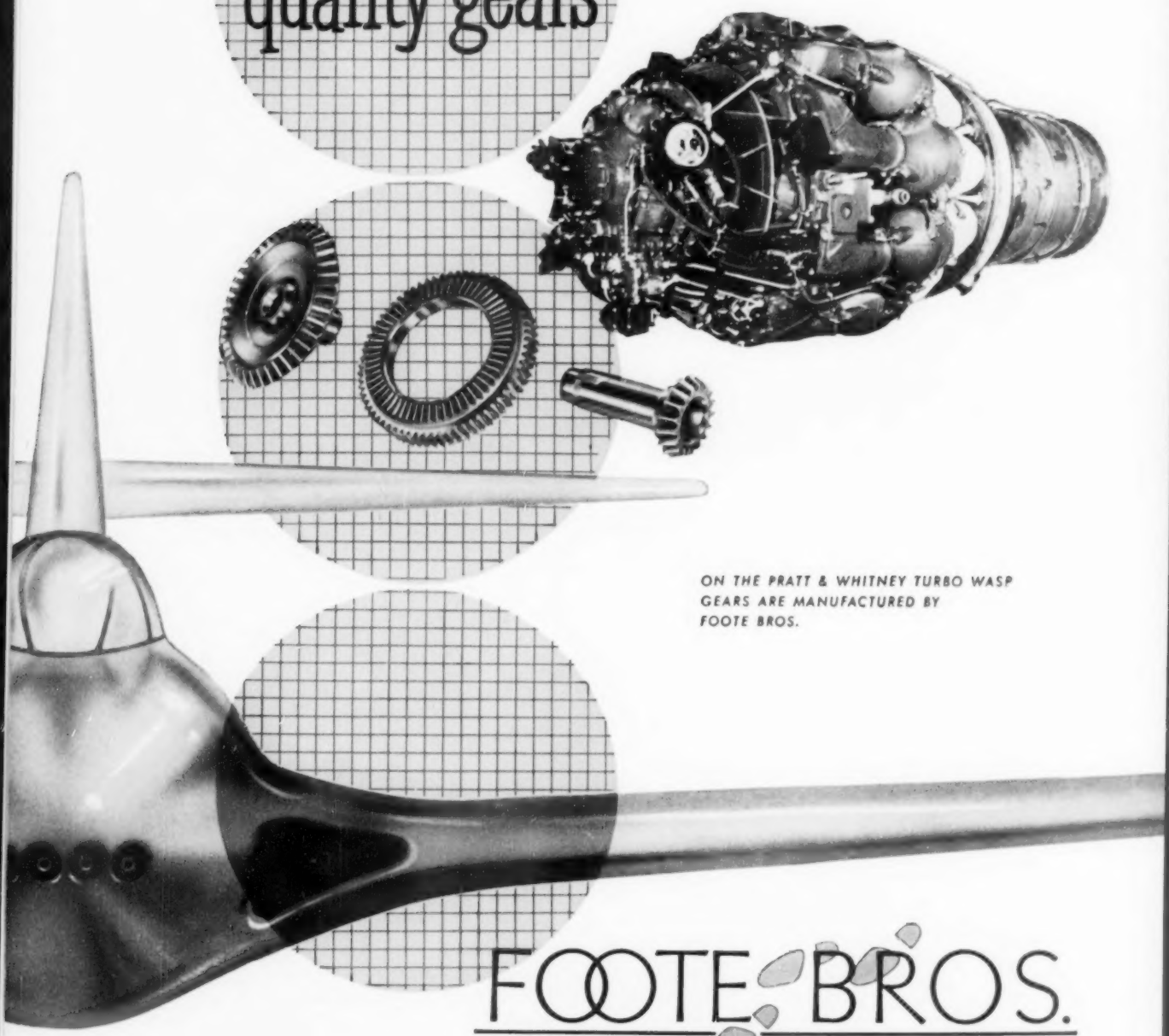

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